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ABSTRACT

This paper synthesizes the issues, problems, research, and current best practice in secondary education in Latin America and the Caribbean. Overall, Latin America and the Caribbean enroll much lower percentages of school age children in secondary education than the region's chief competitors, and the region's secondary education is inadequate by international standards. Secondary vocational education is usually low prestige, underfunded, and inadequately linked to the labor market. Expenditures per student are much lower than the region's competitors. The paper identifies six critical areas for quality improvement, including: increased learning of higher order skills in mathematics, communications, and language and better measurement of achievement; more effective instruction, schools, and systems; public school management reform; use of technology for improvement of educational quality; reassessment of the relationship between secondary schooling and the labor market; and more and better research on what works in secondary education in terms of increased learning, retention, and performance in the labor market. The paper estimates critical quantitative, financial, and human resources needs during the next 10 years and identifies a variety of strategies for meeting the challenges in a cost-efficient manner. (Contains 88 references.) (SM)

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Secondary Education in Latin America and the Caribbean:

The Challenge of Growth and Reform

Laurence Wolff
Claudio de Moura Castro

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The Challenge of Growth and Reform

Laurence Wolff
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Inter-American Development Bank

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Foreword

The mounting interdependence of markets and the increasing intellectual content of production, require a labor force with stronger skills in mathematics, language and communications as well as more flexibility, creativity and an ability to work cooperatively. Secondary education is critical to the success of nations in this new environment. In order to compete effectively, the countries of Latin America and the Caribbean must address the challenge of providing improved access to secondary education while enhancing its quality and relevance. This paper provides a timely synthesis of the issues, problems, research and current best practice in the region and elsewhere. Among other elements, it identifies six critical areas for quality improvement—increased learning and measurement of achievement; more effective instruction, schools and systems; management reform; use of technology for quality improvement; reassessment of the relationship between secondary schooling and the labor market; and research on "what works." The paper estimates critical quantitative, financial and human resources needs during the next ten years and identifies a variety of strategies for meeting the challenges in a cost-efficient manner. On this basis, this report may provide useful guidance for policymakers.

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Summary

This paper summarizes the available information and recent experience of secondary education in Latin America and the Caribbean, identifies critical issues, and provides an "indicative" agenda for growth and reform—"indicative" because data and information are inadequate and because individual countries need to define their own needs and specific policies.

THE CURRENT SITUATION

The changing characteristics of today's and tomorrow's economies, especially globalization and the increasing intellectual content of production, require a labor force with stronger mathematics, language, and communications skills, as well as flexibility, creativity and an increased ability to work together cooperatively. In developed countries these demands have resulted in virtually universal secondary education, revised curricula, and higher learning standards. In contrast, Latin America and the Caribbean enroll much lower percentages of school age children in secondary education than the region's chief competitors. In the region learning in secondary education is inadequate by international standards; the implemented curriculum is outdated and poorly matched with labor market needs; teachers have inadequate subject knowledge, poor pedagogy, and are often unmotivated; learning materials are scarce and inadequate; schools rarely have a sense of mission and identity, and school directors usually have little authority and recognition. These problems are complicated by the increasing numbers of students entering secondary education with far different social backgrounds and needs, compared to those who previously participated in a relatively elitist system. Furthermore, the poor, especially those in rural areas, are grossly underrepresented, and large numbers of young adults are still in secondary education, mainly a result of repetition at earlier levels and in secondary schools.

Fortunately, nearly every country in the region has begun to pay attention to secondary education. While few of these efforts have been adequately evaluated, this paper identifies some of the most promising innovations, focusing on improving the quality of education and on meeting needs for quantitative expansion.

IMPROVING THE QUALITY OF SECONDARY EDUCATION

There are six critical areas for improving the quality of secondary education. Many of these are similar to those of primary education. The first critical area is to focus on increased learning of higher order skills in mathematics, communications, and language and to measure progress toward learning goals. At the same time traditional academic competencies must be complemented by a wide variety of other skills, such as civic responsibility in a democratic society, creativity and innovation, cooperative problem solving and teamwork, an understanding of the role of technology in society, and environmental awareness. Secondly, attracting higher qualified teachers into secondary education will be fundamental, since secondary school teachers have many more labor market options than primary school teachers. Teacher training institutions and faculties need to receive special attention since they are essential for each country's economic future. They need especially to focus on increased subject matter knowledge. Third, public school management reform will need to focus on giving the school director

authority and adequate remuneration, ensure that he/she is qualified, and provide feedback as well as rewards on the basis of performance. Fourth, technology appropriately used can improve the quality of education. Fifth, the structure of secondary education and its relationship to work must be rethought. For example, business and clerical training will need to become more closely integrated into academic schools, and technical courses moved to the post-secondary level. To prepare the less academically inclined students for work, countries in the region will need to identify and experiment with a variety of models, keeping in mind that vocational training for the less academically inclined is best located outside the formal system in modular training programs more closely linked with industry. Finally, more and better research is needed on what works in secondary education in terms of increased learning, retention, and performance in the labor market.

MEETING THE CHALLENGE OF GROWTH AND REFORM

The region needs to increase enrollments rapidly to keep up with both labor market and social demands. Governments participating in Santiago summit of the Americas proposed that enrollment ratios increase from the current 55 percent to 75 percent by the year 2010. Based on a simulation of possible increases in secondary education, to achieve these goals the region would need to invest over US$10 billion in secondary school construction, and recurrent costs would have to double in real terms. Given the recent and anticipated economic growth of Latin America, significant quantitative increases and qualitative improvement could be affordable for most, but not all, countries in the region, provided cost effective education policies are followed, especially with regard to encouraging better use of teacher time, increasing student contact hours, using distance education to reduce costs and reach underserved groups, reducing repetition, and leveraging public funds by encouraging increased private sector investment in secondary education. The level of increases in enrollment in each country will depend on socioeconomic conditions and perspectives, as well as on the rigor by which countries identify cost-effective solutions. For equity, countries will need to implement proactive policies targeting the poor and underserved. Given the scale of the effort needed, government actions must be in partnership with all stakeholders, including parents, labor unions, the informed public, and the private productive sector.

The Economic and Social Context

This paper examines the current status of secondary education in Latin America in the context of world-wide economic changes and identifies a wide variety of policy options for ensuring that secondary education can play a positive role in the region's economic and social development. It focuses mainly on formal, academic education rather than on vocational and other forms of job-oriented training.[1] The paper begins with a review of the current situation with regard to quality, efficiency, equity, costs, and structure using a variety of statistical, analytical, and anecdotal sources. It continues with a summary of policy options with regard to quality improvement and quantitative expansion, including scenarios for meeting financial needs. An annex provides a detailed planning exercise estimating, on a country by country basis, the costs of meeting both quantitative and qualitative goals. The paper does not provide a detailed country by country menu for reform, nor should it be considered a definitive analysis of the subject.

At the outset it should be noted that secondary education, until recently, has been the "forgotten" level of education in the region. This has been a result of lack of political visibility and the weaknesses of the constituencies for this level of education. Higher education always had strong interest groups behind it and political activism at this level has been conspicuous. Primary education has been targeted during the past decade since this level has the most glaring shortcomings. Multilateral banks have been very active in this area and effective reform and improvement are taking place. The result everywhere has been increased primary school graduates, many of them with aspirations to continue their education at the secondary level. At the moment when there is a great need to expand and reform secondary education, the requisite funds are lacking, and the analytical work has not been undertaken. This is one reason the recommendations in this paper must be considered preliminary.

There is now a strong movement in many countries in the region to pay attention to secondary education. Chile, Argentina, Colombia, Uruguay, Barbados, Paraguay, and El Salvador have recently undertaken major efforts to expand and improve secondary education. El Salvador, Costa Rica, Dominican Republic, Mexico, and others have sought to expand and improve lower secondary education (grades 6-9). Brazil is making secondary education its priority over the next four years. Peru is beginning a major reform of the structure of secondary education as well as a major expansion. The time is therefore ripe to review issues and identify critical areas for action.

Secondary education in the region faces the same issues of changing economic structures as the rest of the world. Economic organizations everywhere now must emphasize speed, low cost, and continuous innovation. Facing intense price competition, countries need to constantly search for ways to encourage production efficiency through improving the mix and use of capital and labor; companies need to monitor the preferences of customers and maintain a constant vigil for ways of improving goods and services. In this new world workers from the factory floor to the front line need to develop a

[1] A separate paper (Castro, Carnoy and Wolff, forthcoming) examines in greater detail issues related to the structure of secondary education and the relationships between education and the world of work.

set of new and more sophisticated skills, including technical knowledge, trainability and flexibility, increased responsibility, analytical capacity, innovative skills, cooperative work skills, and communication skills.

These characteristics of today's and tomorrow's economies require a new paradigm of pedagogy within the schools. The changes are summarized in Table 1.

In developed countries the impact of market changes has also meant that secondary education is now nearly universal. With a universal clientele this means that the nonacademically inclined must gain the fundamentals of mathematics, communications, language, problem solving, and other skills necessary for today's and tomorrow's marketplace. One fundamental challenge in developed as well as developing countries is, therefore, to provide higher order skills in an appropriate context to the nonacademically inclined.

As Latin America and the Caribbean have emerged from the downturn of the late 1980s and early 1990s, the most rapid growth has been in nontraditional industries. In accordance with international trends, restructured economies and private businesses in the region are demanding more flexible, trainable labor, especially in the more developed economies. Unfortunately, human capital accumulation in Latin America has been not only weak, but unequal. The region's poor record in education is costly for growth and exacerbates income inequality (Birdsall, 1998). Gross enrollment ratios of 53 percent are below the average for countries at similar levels of GDP per capita. The impact of world trends on secondary education will be very similar to that of developed countries, although delayed by perhaps 10 to 20 years, since enrollment ratios are currently relatively low, and since some countries and sub-regions will continue to rely on primary exports and low wage structures for some time.

Table 1
Matches between Workplaces and Pedagogies

Traditional Arrangements		New Arrangements	
Workplace	**Pedagogy**	**Workplace**	**Pedagogy**
1. Passive order-taking in a hierarchical work organization; heavy supervision to control workers.	1. Teachers as experts convey knowledge to passive learners.	1. Workers are expected to take responsibility for identifying and solving problems and for adapting to change by learning.	1. Under teacher support and guidance, students assume responsibility for learning, in the process developing knowing-how-to-learn skills.
2. Emphasis on limited responses to limited problems and on getting a task done.	2. Emphasis on facts and getting right answers.	2. Workers deal with non-routine problems that have to be analyzed and solved.	2. The focus is on alternative ways to frame issues and problems.
3. Focus on the specific task independent of organizational context or business strategy.	3. What is to be learned is stripped of meaningful context.	3. Workers are expected to make decisions that require understanding the broader context of their work and their company's priorities.	3. Ideas, principles and facts are introduced, used and understood in meaningful context.

Source: Golladay et al., 1996.

The Current Situation

Secondary education in the region has always sought to prepare and select for higher education and to provide terminal education for those entering the labor market. The region has found it difficult to meet these objectives because of the qualitative, funding, management and teaching weaknesses described below. Increasingly secondary education is being asked to take on new roles in terms of inculcating values such as citizenship, environmental awareness, cooperation, and democratic participation. All of these needs and problems are becoming more pressing as increased numbers of students enter secondary education with far different social backgrounds from those who previously participated in a relatively elitist system. The region is deficient in the availability of places in secondary education, as well as in the provision of quality, efficiency and equity. The structure and often the content of secondary education is outdated.

This section examines three sources of data and information to identify issues in secondary education: 1) standard statistics gathered by all countries; 2) research and education sector on this level of education; and 3) anecdotal evidence and observations by experts working in the area. Examining these three areas we can begin to identify the main issues of secondary education.

LOW ACCESS, EFFICIENCY, AND EQUITY

Definitions

Countries define the length of secondary education differently, ranging from three to seven years. Table 2 summarizes the official length of secondary education in the region. In the majority of countries secondary education is five or six years in duration, usually with a "junior" and then a "senior" secondary cycle. The junior secondary cycle is usually considered as part of "basic" education—of eight to nine-year duration and considered the minimum that all children should complete.[2] In Brazil and El Salvador secondary education lasts only three years; in Jamaica it is seven years long; and in Bolivia, Chile, Dominican Republic and Venezuela it is four years in length. These differences in the official length of secondary systems make statistical comparisons as well as generalizations difficult.

Table 2
Official Length of Secondary Education

Seven years	Jamaica
Six years	Colombia Cuba Ecuador Guatemala Haiti Mexico Panama Paraguay Uruguay
Five years	Argentina Costa Rica Honduras Nicaragua Peru Trinidad and Tobago
Four years	Bolivia Chile Dominican Republic Venezuela
Three years	Brazil El Salvador

[2] But this is usually not the case.

Enrollment Ratios

Accepting each country's definition of the length, in 1995 the gross enrollment ratio in the region as a whole was 55 percent compared to 49 percent in 1985, and absolute enrollment was 29 million.[3] This compares with enrollment ratios in the OECD and East Asian countries of close to or more than 100 percent. These ratios vary greatly within the region. Jamaica, Colombia, Cuba, Panama, Uruguay, Argentina, and Chile enroll over 65 percent of the cohort; while the enrollment ratio in Guatemala, Haiti, Paraguay, Honduras and Venezuela is under 40 percent (Table 3).

Overall, compared with the rest of the world, most countries in the region have enrollment percentages lower than can be expected given their per capita income. Table 4 compares enrollment ratios in Latin America and the Caribbean with the average for countries with similar per capita incomes. Within the region, differences are mainly a result of the relative economic development in the region, but also the quality and efficiency of primary education. Compared with per capita income, countries enrolling far less than would be expected include Brazil, Venezuela, the Dominican Republic, El Salvador, Bolivia, Guatemala and Haiti. In contrast, Cuba, Uruguay, Argentina, Chile and Trinidad and Tobago enroll more students than would be expected given their per-capita income.

In most of Latin America, differences between gross and net enrollment ratios are high. In the worst case (Brazil) the net enrollment ratio is 19 percent, compared to a 45 percent gross enrollment ratio. Similar differences, but not as great, occur in all the Spanish-speaking countries for which data are available (e.g., Venezuela, 35 percent and 20 percent; Dominican Republic, 41 percent and 22 percent; Chile, 67 percent and 50 percent), but not in the anglophone countries. The difference between net and gross enrollment is a result of large numbers of overage youths as well as young adults attending secondary schools, with many youths of secondary age still in primary school. This problem is a result of the "culture of repetition" in the region, which has annual repetition rates of up to 40 percent for school age children in primary education. Older students are more likely to need to work and may have to attend school part-time. In addition, Chile, Uruguay and Brazil have recently reported high repetition in secondary education. With the exceptions of Guatemala and Bolivia, where girls' enrollment is lower than that of boys, there is little difference between girls' and boys' enrollment in secondary education in the region. In several countries girls' enrollment ratios are slightly higher than those of boys.

[3] An analysis of the data on "middle school" (grades 6 to 8) for Brazil shows that enrollments in grades 6 to 8 are equivalent to 80 percent of the school age population. If Brazil considered secondary education to be six years equivalent, then its overall enrollment ratio would be 65 percent rather than 45 percent, and the region as a whole would show a significantly higher gross enrollment ratio.

Table 3
Secondary Enrollment Ratios

	Gross Enrollment Ratio (Total Enrollment as a % of Relevant Age Group)		Net Enrollment Ratio (% Enrolled of Relevant Age Group)	
	1985	1995	1985	1995
7-Year Duration	%	%	%	%
Jamaica	59	66	57	64
France	90	110	82	92
Luxembourg	75	74	66	n/a
New Zealand	85	117	84	93
Spain	98	118	n/a	94
United Kingdom	84	134	80	92
6-Year Duration				
Colombia	48	67	n/a	50
Cuba	82	80	67	*82*
Ecuador	58	50	n/a	n/a
Guatemala	19	25	n/a	n/a
Haiti	18	22	n/a	n/a
Mexico	57	58	46	*46*
Panama	60	68	48	*51*
Paraguay	31	38	n/a	33
Uruguay	71	82	56	n/a
Australia	80	147	78	89
Belgium	102	144	89	98
Canada	99	106	88	92
Denmark	105	108	83	86
Japan	95	98	95	96
Korea, Rep.	92	101	84	96
U.S.A.	97	99	91	89
5-Year Duration				
Argentina	70	77	n/a	*59*
Costa Rica	40	50	34	43
Honduras	37	32	n/a	*21*
Nicaragua	34	47	19	*26*
Peru	63	70	49	53
Trin. & Tob.	83	72	71	*65*
Ireland	98	114	n/a	n/a
4-Year Duration				
Bolivia	39	37	27	*29*
Chile	67	69	n/a	55
Dom. Rep.	51	41	n/a	22
Venezuela	24	35	16	20
Hungary	72	81	70	73
Poland	78	96	73	83
3-Year Duration				
Brazil	35	45	14	19
El Salvador	25	32	n/a	21
WEIGHTED AVERAGE		**55**		
SIMPLE AVERAGE	**49**	**53**		

Sources: UNESCO, World Education Report, 1995; 1998. World Bank, World Development Indicators, 1998.

Table 4
Secondary Level Gross Enrollment Ratios
(% of Relevant Age Group – 1996)

Low Income Countries (US$760 per capita or less)		Lower Middle Income Countries (US$761-3,030)		Upper Middle Income Countries (US$3,031-9,360)	
Cuba	80	Peru	70	Uruguay	85
Nicaragua	44	***World Average***	***69***	Argentina	77
World Average	***42***	Colombia	67	Chile	75
Honduras	32	Jamaica	66*	Trinidad and Tobago	74
Haiti	22*	Ecuador	50	Panama	68
		Costa Rica	47	**World Average**	***61***
		Paraguay	44	Mexico	61
		D. Republic	41	Brazil	45
		Bolivia	37*	Venezuela	40
		El Salvador	34		
		Guatemala	26		

Source: World Development Indicators, 1998 and 1999.
*Figure corresponds to 1995.

Student/Teacher Ratios

Reported student/teacher ratios in the region (Table 5) range from 8:1 in Argentina and Venezuela, to 11:1 in Brazil, and 38:1 in Nicaragua, with a weighted regional average of 16:1. It is very likely that teachers in countries such as Argentina, Venezuela, and Brazil are being double-counted, since they may work in two different institutions, often one public and one private institution. This makes comparisons and policy decisions problematic. A more important measure would be the student/class ratio. Statistical systems in the region generally are not able to clarify this issue. With the exception of Nicaragua and Honduras, student/teacher ratios do not appear excessively high (over 25:1).

Expenditures per Student

Reported current expenditures per student in secondary schools vary from $67 in Guatemala and $75 in Dominican Republic, to $964 in Argentina, expressed on the basis of official exchange rates. These figures compare with $4,000 to $7,000 per year in OECD countries. In the 1980s real public spending per pupil in elementary and secondary education dropped in a number of countries, including Argentina, Chile, Costa Rica, and Mexico, and Venezuela, largely because of sharp declines in real teacher salaries (Carnoy and Castro, 1996; Carnoy and Welmond, 1997). There is little information on per student expenditures in the 1990s but, at the least, it is likely to have held steady or increased given the real average increases in GNP in the region of 3.2 percent per annum during the period 1990-96.

Equity

A comparison of educational attainment by social class (see Chart 1) shows a wide discrepancy between attainment levels of 21 year olds. In Paraguay, for example, on average upper income 21 year olds complete almost twelve years of education compared to five years of education for the poorest cohort. Among countries for which data are available, the highest social class discrepancies can be found in Brazil, El Salvador, Paraguay and Honduras. There are also major inequities within countries. For example, in Northeast Brazil about 25 percent of the higher income age group has achieved ninth grade or higher compared to about 5 percent of the lowest income age group. These inequities are as much a result of the inadequacies of primary education as that of secondary education. In any event, as secondary education enrollment ratios increase, the main new clienteles will be those from the lower and lower middle classes.

Table 5
Student/Teacher Ratios and Current Expenditure Per Student

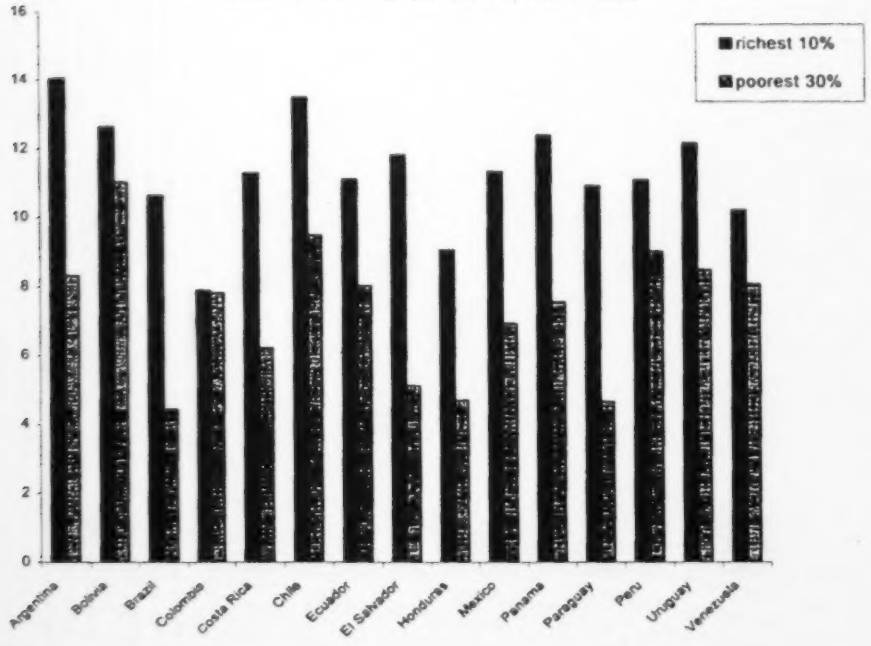
	Student/Teacher Ratio 1995*	Current Expenditure per Student (US$) 1995
7-Year Duration		
Jamaica	22	$378
6-Year Duration		
Colombia	22	$210
Cuba	10	$451
Ecuador	13	$209
Guatemala	*16*	$67
Haiti		n/a
Mexico	17	$664
Panama	18	$358
Paraguay	12	$186
Uruguay	18	$414
5-Year Duration		
Argentina	*8*	$964
Costa Rica	21	$496
Honduras	28	$132
Nicaragua	38	n/a
Peru	19	$219
Trinidad & Tobago	20	$641
4-Year Duration		
Bolivia		$144
Chile	*17*	$374
Dominican Republic	22	$75
Venezuela*	*8*	*$207*
3-Year Duration		
Brazil	11	$615
El Salvador		$81
WEIGHTED AVERAGE	**15.6**	**$498**
SIMPLE AVERAGE	**17.9**	**$344**

(*) To estimate the weighted average, 18 is used as a default ratio when data for the country is not available.

(**) Italics indicate 1992 figure.

Sources: UNESCO World Education Report, 1995, 1998; World Bank, World Development Indicators, 1998.

Chart 1
Education Attainment of the Richest and Poorest 21 Year Olds
in the 1990s (average years of education attained)



Source: Calculated using data from Behrman, Birdsall, Székely (1998).

Private Education

Over the ten-year period of 1985-1995, the percentage of students enrolled in private schools has kept pace with the overall rapid increase in total enrollment and now averages around 20 percent. Among the countries for which data are available, the range is from 10 percent in Costa Rica to 44 percent in Chile and 64 percent in El Salvador (Table 6). It is obvious that the middle and upper middle classes depend heavily on private schools. This is in contrast to the situation a generation ago when there were, in most countries, a number of elite, high quality, public secondary schools. But many private schools also serve less privileged groups. On average, private school students score much higher on standardized achievement tests than public school students. There is some evidence (Jiménez, 1995, on the Dominican Republic; Swope, 1998, on Fe y Alegría) that privately managed education is less costly than public education on a per student basis and, even after controlling for social class, has higher achieving students. This is apparently a result of increased attention to results by strong school directors, higher student/teachers ratios, and greater expenditures on learning materials. These conclusions are contradicted by recent research on Chile (Carnoy, 1998) that shows that, as private schools increasingly become publicly subsidized they lose their cost advantages, continue to select only those students with expected higher academic achievement, and do not do better with poorer students.

Table 6
Enrollment in Private Schools

	1985 (%)	1995 (%)
7-Year Duration		
Jamaica	4	N/A
6-Year Duration		
Colombia	42	39
Cuba	--	--
Ecuador	34	--
Guatemala	38	--
Haiti	84	--
Mexico	4	--
Panama	14	13
Paraguay	23	24
Uruguay	15	16
5-Year Duration		
Argentina	30	--
Costa Rica	9	10
Honduras	42	--
Nicaragua	20	24
Peru	15	16
Trinidad & Tobago	--	--
4-Year Duration		
Bolivia	--	--
Chile	39	44
Dominican Republic	30	33
Venezuela*	25	35
3-Year Duration		
Brazil	--	--
El Salvador	51	64

Source: UNESCO World Education Report, 1995, 1998.

Teachers and Teacher Training

The available data shows that the percentage of teachers with higher education degrees is low. Only 39 percent of secondary school teachers in Argentina have higher education degrees. The comparable percentage in Panama is nine. Although the number of teachers increased rapidly in the region during the 1980s, the drop in teachers' real salaries during that decade created a recruitment crisis in countries such as Argentina, Costa Rica, Peru, and Uruguay. According to one analysis, the number of first year teacher education students in Argentina fell from 14,000 in 1987 to 10,400 in 1992, and is increasingly drawn from high school graduates who have failed in their pursuit of university careers (Braslavsky, 1995). Although this analysis refers to primary school teachers, a similar problem reportedly exists for university-trained secondary school teachers. In Uruguay, a shortage of applications for teaching posts led to acceptance of uncertified applicants for hard-to-fill posts in rural and marginal urban areas and to proposals to reduce the course work in the *institutos normales* from four to two years (Filgueira and Marrero, 1995). All this occurred despite rising real (and relative to middle-level

urban wages) salaries for Uruguayan teachers.[4] In Costa Rica, the Ministry replaced almost 20 percent of qualified teachers in secondary schools with *aspirantes* and *autorizados*, both unqualified categories for teachers (Carnoy and Torres, 1994). In Peru, the proportion of uncertified teachers increased in the 1980s, so that by 1990, almost 50 percent of secondary teachers were uncertified (World Bank, 1993).

Vocational/Technical Education

The structure of secondary education, especially the relationship between vocational/technical and academic education, varies greatly throughout the world. In fact, secondary and post secondary school structures have been referred to as "jungles or mazes," especially with regard to technical/vocational and work-related activities. The United States and Canada have a single comprehensive secondary school, within which academic programs with varying degrees of tracking and demands, as well as vocational/technical programs, are offered. Germany sends 36 percent of each secondary school cohort to vocational schools, including its "dual" apprenticeship system. France splits post primary schools into different modalities—math/science, arts and humanities, commercial, technical—and also has separate vocational schools. Traditionally, Latin America and the Caribbean have opted for the academic/vocational dichotomy; and several countries have also adopted the French model of splitting academic schools. Table 7 summarizes the structure of upper secondary education in six OECD countries.

It should be emphasized that the definition of technical /vocational schooling varies greatly in the region[5] as well as in OECD countries. Table 8 summarizes the current situation in terms of enrollment in these schools as defined by each country. The percentage of students attending vocational/technical secondary schools varies greatly from country to country, but averages 30 percent for the region as a whole. In Argentina, 60 percent of students attend what are defined as vocational, technical, and professional schools. In the English-speaking Caribbean countries and Mexico, only five to 12 percent of secondary school students attend vocational schools.

INADEQUATE AND OUTDATED LEARNING, PEDAGOGY, MANAGEMENT, AND CURRICULUM

Learning

The TIMSS/IEA mathematics and science tests are the only recent study which compares learning at the secondary level in the region with the rest of the world. In this case, Colombia (eighth grade) is the only Latin American country represented. Colombia scored 41st out of 42 countries. At least ten of those countries had per capita incomes equal to or less than that of Colombia. In 1992 Venezuela and Trinidad and Tobago participated in that year's IEA reading survey of eighth graders. Venezuela scored lower than all countries except Nigeria, Zimbabwe, and Botswana. Trinidad and Tobago scored above those countries as well as above Thailand and the Philippines, suggesting that the English-speaking countries of the Caribbean may be doing better in education than other Latin America countries. Country assessments of secondary school achievement have begun in El Salvador, Costa Rica, Brazil, Argentina, and other countries. These studies invariably show that children are achieving far below the levels expected as defined by leading educators and curriculum experts.

Pedagogy

Based on much anecdotal but little systematic evidence, classroom pedagogy is usually outdated, based on frontal lectures, with insufficient student participation and little use of textbooks or teaching materials other than chalk and talk. While there is discussion of new pedagogical trends, such as constructivism, classroom practice benefits little from this approach except in a

[4] A major new program in Uruguay seeks to reverse this trend.

[5] Training courses outside the formal system (e.g., SENAI/SENA-type training courses) are not included in the data.

Table 7
Characteristics of Upper Secondary Education in Six OECD Countries

Country	Principal characteristics	Years of Upper Secondary Education	Percentage in "general" education
USA and Canada	Single comprehensive school, wide variety of course offerings at different levels of difficulty.	3 or 4	100
France	Secondary schools streamed according to math/science, arts/humanities, commercial, and technical specialization. Separate vocational and apprenticeship schools.	3	72
Italy	Separate general, teacher training, technical, vocational, and fine arts schools, with the latter three including work experience.	5	56
Germany	Separate grammar, technical, and vocational schools with work experience required for vocational/technical students.	4 or 5	64
England	Two years of comprehensive, "modern" (e.g., vocationally oriented) and "grammar" (e.g., academic) schools followed by two years of college preparatory ("A" level) or terminal "further education" courses.	4	61

Table 8
Shares of General and Technical Education Enrollment at the Secondary Level (Most Recent Estimates)

Country	Year	% Gen. Ed.	% Vo-Tech
Argentina	1985	40	60
Belize	1994-95	99	1
Bolivia	1990	---	---
Brazil	1985	33	49
Chile	1996	56	44
Colombia	1993	76	21
Costa Rica	1995	78	22
Dominican Republic	1994-95	91	8
Ecuador	1992-93	66	35
El Salvador	1993	25	74
Guatemala	1980	70	17
Guyana	1994-95	100	0
Haiti	1985-86	97	2
Honduras	1991	65	30
Jamaica	1985-86	96	4
Mexico	1994-95	89	11
Nicaragua	1993	92	7
Panama	1990	74	25
Paraguay	1994	92	8
Peru	1995	100	0
Suriname	1992-93	59	35
Uruguay	1995	84	16
Venezuela	1992-93	82	18

Source: UNESCO, Statistical Yearbook, 1997, Table 3.7.

small number of schools.[6] Teaching materials, basic library materials, science and other types of equipment, libraries, computers, copy machines, and other tools which can strengthen the pedagogical process are lacking. There is little systematic information but much anecdotal evidence on the inadequacies of teacher training. Teacher training is the lowest prestige program, and teacher trainers often the least qualified among university staff. There is excessive emphasis on the theoretical elements of the psychology of education, and inadequate subject matter preparation and practice teaching.

Management

There is almost no research in Latin America that systematically identifies process and management issues, or seeks to identify the reasons why some schools are more "effective" than others. Based on much anecdotal evidence, many secondary schools in the region do not operate as coherent institutions with a sense of identity, cohesion, and commitment. There are many "taxi" teachers, who teach in two or more institutions. School directors enjoy little recognition or authority. There is little interaction with the community or with parents. Because of the nature of funding and management, many public schools are poorly maintained, often dirty, with broken windows and nonfunctioning equipment. Since 1994, many countries in the region have initiated programs to address and resolve these problems.

Curriculum

The TIMSS/IEA study reviewed mathematics and science curriculum and textbooks, and provided partial information for Mexico, Argentina, and Colombia. The review showed that while the official curriculum in math and science was roughly comparable to that in the developed countries, Mexican and Colombian textbooks (but not Argentinean textbooks) were deficient in "mathematical reasoning" and "complex communications" (which are "higher order skills") compared to most OECD countries. As reported by the TIMSS study, the mathematics and science curriculum in the three countries was reasonably up to date, but curriculum goals are not achieved because of inadequate teaching, too little time on task, and lack of teaching materials. There was a striking lack of coordination between the formal curriculum, the curriculum as presented by the teacher in the classroom, and what is learned by the student.

As noted, while the formal academic curriculum in math, science, and language is often up to date, in most countries studied, children on average learn half of what is in the official curriculum. Much of what is taught also appears irrelevant to those expecting to enter the labor market or already in it. Some curriculum areas, such as technology, health, and civic education, are nonexistent or out of date. However, to some extent the region's autonomous training institutions, such as SENAI, SENAC (Brazil), and SENA (Colombia), have made up for the failures of the formal education system by providing modular training opportunities to primary and secondary school leavers.

Structure

Based on observation and discussions, with only a few exceptions, traditional vocational secondary schools are inadequately funded, poorly linked with the labor market and are not considered prestigious. Secondary technical education, when adequately funded, has often prepared students for higher education rather than for the labor market. Private schools teaching business, computer, accounting, and secretarial courses have sprung up everywhere to fill the gap. Training of primary school teachers at the secondary level is no longer viable in the few countries where it continues. Comprehensive secondary schools, styled after those in the United States, have not taken hold except in a relatively small number of schools in Colombia (INEMs) where, contrary to their initial objectives, the vast majority of graduates go on to higher education.

[6] In many faculties of education in Latin America there appears to be a misunderstanding that the concept of "constructivism" requires that individual teachers invent their own pedagogical approaches rather than identify, adapt, and utilize best practices to meet students' needs.

A SUMMARY OF ISSUES

Based on regional and country data, research and observations, the following conclusions can be reached:[7]

Access and Equity

Enrollment ratios in secondary education are much lower than in the region's chief competitors; large numbers of overage children and young adults are enrolled, mainly as a result of repetition at earlier levels; the poor, especially those in rural areas, are grossly underrepresented in secondary education; and secondary education programs rarely, if ever, take into account the needs of working students and potential students living in rural areas.

Structure, Content, and the Relationship of Schooling to Work

Secondary vocational education is usually low prestige, underfunded and inadequately linked with the labor market; some technical programs have served as preparation for higher education rather than the labor market; public commercial education is inadequate. Training of primary school teachers at the secondary level is no longer appropriate in the few countries where it continues; and a number of critical new curriculum areas, such as civic education, health education, and technology awareness, are not yet developed.

Learning

Achievement levels in secondary education are inadequate by international standards. While the formal academic curriculum is often up to date, classroom teaching and learning as well as textbooks are rarely adequate to meet curriculum goals and pedagogy is inadequately linked with real life experiences. Students attending night school and/or working, as well as older and poorer students, score lowest on standardized achievement tests. Teachers, student, parents, and employers do not have clear and verifiable measures of learning standards and achievement. Teachers have inadequate subject knowledge, poor pedagogy, and are often unmotivated. Learning materials are scarce and inadequate. Public schools rarely have a sense of mission and identity, and school directors have little authority and recognition.

Costs and Efficiency

Expenditures per student are much lower compared to the region's competitors but vary greatly from one country to another. Student/teacher ratios also vary greatly and there is inadequate information on teacher utilization and student class size; and repetition and dropout rates are excessive.

In spite of, or perhaps in response to, the bleak diagnosis described above, the conditions of secondary education in Latin America are changing. In the last five years, Argentina, Mexico, Chile, Uruguay, Colombia, El Salvador, and the Brazilian states of São Paulo and Paraná have initiated secondary education growth and reform efforts. In the Caribbean, Trinidad and Tobago and Barbados have launched secondary reform and expansion efforts. The federal government of Brazil has approved major curriculum and structural reforms and is planning to make secondary education its priority over the next four years. Peru is beginning a major reform of the structure of secondary education, as well as an expansion. Nearly every other country in the region is initiating secondary education growth and reform programs.

Efforts need to focus on two areas—quality and quantity. The third chapter summarizes the six critical areas for quality improvement. The fourth chapter summarizes the quantitative challenge and how it can be met. Both these

[7] A number of detailed country studies of secondary education have recently been undertaken, in part through IDB and World Bank financing, and provide analyses of the situation on a country by country basis, mainly using statistical approaches (e.g., flow models, financing and costs, enrollment ratios, multivariate statistical correlation analysis, etc.). The results of these studies in each country are summarized in Annex 1. Overall, they corroborate the problems described above of low enrollment rates, low achievement levels, low teacher quality, lack of input quality, repetition, and inequity.

sections take into account current reform efforts, most of which have been initiated but not yet evaluated.

Reform issues facing the region are both different from and similar to those faced in Europe and North America. The difference is that Europe and North America are at or close to providing universal secondary education up to age 18 or 19; and especially in Europe, that learning and achievement is far higher than the levels in Latin America and the Caribbean. The similarities include: the increasing complementarity of academic and vocational education, an emphasis on higher order learning, a concern with civic and moral education, decentralization, and improving teacher quality. Annex 2 summarizes current reform efforts in Europe and the United States.

Six Critical Areas for Improving the Quality of Secondary Education

This section discusses an agenda for improving the quality of secondary education in the region. This is an incomplete agenda because current data and information are inadequate and individual countries need to define their own objectives and strategies.

Quality has many valid definitions, which are summarized in Box 1.

Based on experience to date and these definitions, the following six areas are critical for quality improvement:

- Increased focus on learning and on the measurement of achievement.
- More effective instruction and better teachers.
- Management reform.
- Using technology and learning materials appropriately for quality improvement.
- Rethinking the structure of secondary education and its relationship to the world of work.
- Undertaking applied research on what works in terms of learning, retention and labor market performance.

INCREASED LEARNING AND MEASUREMENT OF ACHIEVEMENT

Quality improvement means increased learning, especially of higher order skills in mathematics, communications, and language. The increasing awareness of the inadequacy of learning in the region has led to the inception of national testing in nearly every Latin American country. An increasing number of countries are participating in international testing programs.

However, testing, setting standards, and reporting results do not guarantee increased learning, any more than measuring crop output guarantees improved crop productivity. But this information can help lead to a new role for the informed public—an understanding that the object of schooling is learning and an insistence that schools provide the environment and opportunity for such learning. Industrialists, for example, need to understand that, even though their children may attend private schools, the quality of public education also affects them, since public schools are producing tomorrow's workers. The mass media and politicians need to understand that good education is good politics. And the informed public needs also to insist that every candidate for public office has an articulate education policy.

To make testing a tool for encouraging increased learning, clear standards must be articulated and test results need to be disseminated to the principal stakeholders (teachers, students, parents, industrialists, politicians, etc.) in a user friendly form. Also, testing needs to be technically of adequate quality—permitting measurement of the curriculum and fair comparisons, especially of the "value added" of schooling. Finally, coherent strategies need to be designed for the use of the results, for example, to identify, provide incentives for, and reward "effective" schools, and to provide feedback to teachers as well as curriculum and textbook developers (see Wolff, 1997, for a detailed discussion of issues in educational assessment in the region).

BOX 1

What is Quality in Education?

Educational quality has many, sometimes conflicting definitions. Quality is best defined as the extent to which children learn the basic skills and knowledge necessary to function in a modern society and utilize these skills in their life. Since this is difficult to measure, numerous proxies are used, as defined below:

1.) Output quality: The most fundamental definition of quality is that of the extent to which children attain the knowledge and skills which society wishes to impart to them. These knowledge and skills are not simply academic skills (e.g., Howard Gardner has identified seven such dimensions: linguistic, logical-mathematical, bodily-kinesthetic, spatial, musical, interpersonal, and intrapersonal). In the 21st century the technological revolution will require new worker skills. The new worker will need to be a problem solver, flexible, computer literate, a communicator, and able to work in teams. A high quality elementary and secondary school system is one which has a good match between what children learn and what is needed to function in a modern society. Output quality can be measured in the labor market through tests of workers' knowledge and measurement of worker productivity. This is rarely done because of complexity and costs. Within the schools output quality can be measured by achievement tests measuring the extent to which national curriculum goals are achieved. Given current curriculum goals throughout the world designed to educate this kind of citizen, low quality can, in part, be defined as "rote learning or learning in isolation" and high quality would be the learning of higher order skills.

Implications for Latin America: Latin American education systems are not educating the citizen-worker of the 21st century. Nor is the region providing adequate mathematics and reading skills. IEA studies show that LAC countries are far below the developed world and also below the Far East and the Middle East. On international tests, Latin American countries score only above Africa. The English-speaking Caribbean may be doing slightly better.

2.) Quality as Value Added: Quality may be defined in relation to "value-added." In this definition a high quality school or school system is one which increases the learning of students relative to their status at the beginning of their schooling period. This suggests that a school whose clientele is children of illiterate peasants could be "higher quality" than an urban middle class school even if its absolute results, in terms of test scores or retention, were relatively low. Quality as value added can be measured statistically and through time series data. A number of countries are explicitly recognizing this element, especially by providing additional resources to at risk schools, recognizing schools doing better than expected (e.g., France) and providing rewards to schools which improve their scores.

Implications for Latin America: There is not enough awareness of this issue in among Latin American political leaders and the general public. Chile has recognized that low performing schools need special help, and is providing incentives for improved performance.

3.) Quality as high standards: Quality may also be defined as "high examination and promotion standards." This definition is useful if it is accompanied by a commitment that all children can achieve these standards, but is counter-productive if adequate resources are not provided and most children fail. In the United States, chaotic expectations of learning lead to no standards, but states are now seeking to define and enforce standards especially at the secondary level.

Implications for Latin America: There is evidence that teachers are using "high standards" to fail children in first grade since they are unable to read by the end of the first year. But this approach does not take into account different learning styles as well as children's impoverished backgrounds and is counterproductive. At higher grades, while the national curriculum can be clear and modern in its objectives, teachers pay little attention to it and learning is inadequate. The "standards" movement at the eighth grade level requires realistic curriculum expectations and a commitment of adequate physical resources and school processes so that all, or nearly all, children can achieve at the desired level. Brazil is moving in this direction.

4.) Quality of school inputs: Quality is often defined in relation to physical and other inputs, such as school buildings, textbooks, computers and number and educational levels of teachers. A high quality school would be one with good physical facilities, adequate equipment and educational materials, and well trained teachers. It is assumed that input quality will lead to better achievement and retention, and there is a fair amount of research seeking to measure this relationship.

Implications for Latin America: School inputs (e.g., expenditures per student, teacher qualifications) are inadequate in rural schools and often in urban slum schools as well. Northeast Brazil is an extreme example of this problem. A review of research has identified textbooks, teacher subject knowledge, time on task, and school snacks as inputs that have an impact on achievement. However, contrary to popular belief, lower student/teacher ratios are not effective in raising achievement. Teacher qualifications, as measured by number of year of formal training, have also been found to have a weak impact, if any, in student learning, probably due to the fact that years of training is a poor proxy for quality teaching.

5.) Quality in School Processes: Quality may also be considered in relation to schooling processes. In this case quality refers to good school management; well coordinated, modern classroom pedagogical practices; flexibility to revise or change processes as needed; and dedicated teachers working together as a team to achieve specific goals. Good school processes are often the "missing element" necessary to ensure that school inputs lead to increased learning and retention. They can be measured mainly through systematic observation (qualitative research). There is increasing interest in this element of schooling.

Implications for Latin America: The "typical" school has a director selected by central authorities on the basis of bureaucratic criteria; teachers often have two or more jobs, rarely remain in the school building when classes are over, work in isolation, and are inadequately supervised ("civil service" mentality). But there are many efforts in the region to change school processes (e.g., Escuela Nueva in Colombia, EDUCO in El Salvador, community involvement in schooling in Minas Gerais and in secondary schools in Nicaragua, teacher learning circles in Uruguay, etc.).

6.) Proxies for Output Quality: Levels of Literacy and Schooling in the General Population, and Completion and Repetition Rates: Levels of schooling can be taken as proxy for learning in the general population. This assumes rough equivalency of secondary school levels across countries. Within the school system, in the absence of well structured, internationally comparable achievement tests, and considering that it is difficult to test children who drop out of school, the number of children who complete a particular level of schooling (e.g., completion rates) is often taken as a proxy for learning achievement. High repetition rates are also often considered a proxy for low achievement, since clearly something is amiss when upward of 50 percent of children fail the year.

Implications for Latin America: Levels of schooling of the general population in the region are significantly lower than in East Asian countries and the difference is growing. Current completion rates are low, compared to competitors. Repetition, especially in basic education, is the highest in the world, leading to the inefficient use of funds. Repetition is grossly underreported in official statistics. Only modest progress has been made in reducing repetition.

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One way of helping to ensure that feasible curriculum goals are met is to establish minimum proficiency examinations, as is being implemented in Costa Rica (a secondary school leaving test counts 25 percent in the students' final grade), or examinations which are made available on the students' permanent record. This approach avoids the disadvantages of high stakes examinations necessary for graduation, where teachers and students become exclusively preoccupied with "teaching to the test," and would allow for at least some flexibility in curriculum. A number of other countries in the region, including El Salvador, Argentina, Brazil, and Chile, have begun to test secondary school students and, in effect, to establish minimum standards of achievement.

MORE EFFECTIVE INSTRUCTION, BETTER TEACHERS AND REFORMED TEACHER TRAINING

To achieve the goals of increased learning and more effective instruction, more time must be devoted to learning and less to administrative, rote, and routine processes. Teachers need better knowledge of their subject matter and need to have the capacity to vary their pedagogical approaches to achieve different learning objectives with different groups of pupils. The implemented curriculum (e.g., what is taught), not simply the "official" curriculum, must be revised to emphasize higher order skills.

Attracting higher qualified recruits into secondary education will be fundamental. To achieve this, overall teachers' salaries will need to increase. The increased labor market demand for computer skills makes it particularly difficult to recruit mathematics teachers; financial incentives will therefore need to be provided for teachers in areas such as mathematics where there is scarcity. The provision of loans or scholarships to students embarking on a track training course of study (which is being implemented in Uruguay and is under discussion elsewhere), especially for bright but poor students, would attract better students. Any loan elements could be discounted for each year of teaching in public (rural or low-income) secondary schools.

But salary increases without increased professional responsibilities and accountability could well be self-defeating. Teacher career ladders and related financial and other incentives need to be designed to encourage good teaching. Efforts at changing career ladders are underway in several countries. Career ladders could be based in part on observed competence, including increased flexibility to school authorities in providing salary increments on the basis of performance. The title of "master teacher," with accompanying financial rewards for those judged superiors in their pedagogy could be introduced into the career ladder. Teacher unions will have to be convinced to work directly with government on professionalization and higher standards, including eliminating the excessive politicization of negotiations over salaries and working conditions. National campaigns to "value" secondary (as well as primary) school teachers, through awards and recognition, can also help raise the status of the teaching profession. A standards approach to teacher training could include setting up tests for entering teachers, especially in content knowledge, as is already the case in Mexico and the United States

The content of teacher preparation needs a complete overhaul. The first step is to establish a national policy that places special attention on teacher training institutions and faculties since they are essential for the economic future. For example, a fund to support innovation in teacher training could be established, to be awarded on a competitive basis to proposals which seek to change the objectives, content, efficiency and effectiveness of teacher training on a sustainable basis. The focus would be on developing a wide variety of instructional approaches to achieve more demanding and higher order learning goals. Investment packages could be made available to upgrade teacher training facilities, through the provision of computers, audio-visual and other learning materials, and libraries. Program reforms could include: 1) establishing effective practice teaching programs managed by master teachers who are adequately remunerated; 2) developing "sandwich" programs whereby teacher trainees teach full time in schools under the guidance of master teachers before they receive their final degree; 3) ensur-

ing that all future teachers understand and utilize technology in education, including requiring computer literacy for all future secondary school teachers; 4) especially for upper secondary level teachers, an emphasis on subject knowledge; 5) financial and other incentives for the best university professors in subject matter areas to become involved in teacher training; and 6) partnerships between teacher training institutions and individual schools and school systems. At the same time it should be emphasized that research suggests that increased formal qualifications of teachers (e.g., master's degrees) do not necessarily result in increased learning if other elements, especially incentives and working conditions, are not simultaneously changed.

Improved instruction requires more time on task. This involves two elements: the number of student contact hours and the amounts of time students spend actively learning in the classroom and doing homework. The number of student contact hours varies between 600 and 800 according to official guidelines, which is similar to that of developed countries. However, the *actual* number of student contact hours is far lower because of regular strikes, teacher absenteeism, late arrival, and early departure. In nearly all Latin American countries (but not in the English-speaking Caribbean) students need to spend more hours in school. Moreover, there is evidence that large amounts of classroom time are spent on classroom discipline and on routine administrative matters, which reduces the number of hours actually spent learning.

Many countries are beginning to understand the importance of teacher issues. Uruguay has established a special targeted program to train secondary teachers in residential post secondary institutions. Chile, the states of Paraná and São Paulo in Brazil, and Uruguay are increasing student contact hours and reforming teacher education. Chile has established a fund to support teacher training initiatives. Research and related policy discussions are underway in many countries in the region on issues related to teacher remuneration, working conditions, and incentives.

SCHOOL AND SYSTEM MANAGEMENT REFORM

Much of the recent research on effective schools emphasizes the centrality of the school director and the importance of local autonomy and teamwork coupled with system-wide accountability and incentives for increased learning and/or retention of students. Little of this research has been undertaken in the region.

A comparative study of public and private secondary schools in five countries, including the Dominican Republic and Colombia (World Bank, 1995), sheds light on school effectiveness issues. The study found that achievement in private schools was higher and costs lower than public schools even when social economic background was controlled for. While studies in other countries have not found these cost-effectiveness advantages for private education, the conclusions of this study are nonetheless important, since the critical differences between private and public schools were: 1) the private school principal had much more decision-making power; 2) private schools placed a much greater emphasis on academic achievement; 3) student/teacher ratios were higher in private schools; 4) teacher qualifications in private schools were slightly lower; and 5) private schools invested more in educational materials.

There is no reason for public schools not to be able to adopt similar approaches. This would mean ensuring that the school director is qualified, giving him the authority and adequate remuneration, and providing rewards on the basis of performance. School directors would receive significantly higher salaries provided they were selected on the basis of competency and are subject to performance review. Financial and administrative incentives would be used to encourage teachers to teach full time in one school, so that he/she can act as part of a team rather than as an itinerant provider of lessons (taxi-teachers). Secondary school physical facilities will require adequate space for teachers to prepare their lessons and interact with other teachers. Classrooms should be opened up to obser-

vation, assessment and collegial advice in order to end the isolation of teachers.

Parents will need to be more involved but such involvement will not, by itself, result in increased student achievement, especially in lower income districts where parents at best have a primary education.

Decentralization requires a special effort at establishing a central monitoring system, clear standards, intensive guidance and support to schools, especially with regard to instruction. Schools should be relatively free to reward, and in some cases, fire staff, as well as to allocate discretionary funds, but they should be held accountable with regard to improvements in retention and achievement. As one commentator has put it:

> *Is student learning better in schools where there are democratic school councils or in schools where the principal runs the show? ... the whole point of school reform is to have students learn more. If this doesn't happen, the experiment is a failure, no matter how happy the children, the parents and teachers—and the reformers are.* (Shanker)

One critical problem of public secondary education is its abandonment by much of the middle and all of the upper class. To attract the middle class back into the public system, it may be appropriate to establish "magnet" schools or parts of schools (as was the case a generation ago in many countries), with a specific focus on areas such as math and science, music and arts, or liberal arts. Entrance to those schools would be based on competitive examinations (but with special attention to talented children from poorer families) and the schools would impart an instructional level equivalent to the best private schools but at only slightly higher costs than normal public secondary schools. This approach could help to create a lobby of vocal, concerned parents who would support increased learning of all children in the public system.[8] Trinidad and Tobago is one country in the region which has launched such a program.

Chile, El Salvador, the Brazilian states of Minas Gerais and Paraná, Argentina, Paraguay, El Salvador, and Nicaragua are a few of the countries and states which are considering or have initiated such decentralization at the secondary level.

USING EDUCATIONAL MATERIALS AND TECHNOLOGY FOR QUALITY IMPROVEMENT

Low cost science equipment, functioning libraries, copiers, and adequate textbooks are no less critical in the information age than in the past. In most countries, textbooks are purchased by students. It would be appropriate to begin to provide free or subsidized textbooks on the basis of need. Hands-on in-service training is needed in the utilization of teaching/learning materials and to help individual teachers develop their own materials.

Given the scarcity of good quality secondary teachers and inadequate pedagogy, many countries are considering the use of technology in secondary education as a means of both increasing access and improving instruction. Mexico has taken a leading role with its Telesecundaria (television teaching) which today teaches 20 percent of secondary students, and is targeted to rural areas with few students. El Salvador, Guatemala, and Nicaragua are using Telesecundaria material on a pilot basis (see Box 2).

The Brazilian Telecurso 2000 using broadcast TV and tapes targets young adults who did not finish primary or secondary schools. Telecurso is currently beginning to expand directly to regular classrooms, in some cases providing instruction in physics and mathematics when qualified teachers are lacking. Several states are considering replacing night classes, which often require three hours of class every evening, with

[8] One approach would be to incorporate all or a portion of the International Baccalaureate (IB) curriculum and teacher training program. The IB is a high quality international secondary school program originally designed for children of European expatriates but now expanding rapidly, especially in US public schools.

Box 2
Mexico's Telesecundaria: A Cost-Effective Program

Mexico's Telesecundaria program has been existence for 30 years. The project was created thirty years ago, to respond to the needs of rural communities where a regular middle school would not be feasible. Instead of having one teacher for each discipline, Telesecundaria has one single teacher (a "home teacher") who teaches all disciplines for the three grades. After the 1993 reform and the introduction of satellite transmission, enrollment has increased rapidly. The program now serves one million students. The latest version of Telesecundaria puts teachers and students on the screen, brings context and practical uses of the concepts taught and extensively uses images and clips to illustrate and help students. The TV gives teaching its pace. Books pick up where the TV leaves off and follow a minutely detailed organization of the remaining time. At eight o'clock, the teachers in 14, 000 schools in Mexico turn on the TV. The students then watch 15 minutes of television. The set is turned off and the written material and guidebooks take over, providing detailed guidance for the remaining 45 minutes. For example, the teacher asks whether students need to understand better the concepts just seen. Then, they might read aloud, apply what was taught in practical exercises, followed by a brief evaluation of what has been learned. To finish, there is a review of the materials taught. At nine, another discipline starts, following the same routine. The morning classes include the academic disciplines.

Recent research (Castro, Wolff, and Garcia, 1999) has confirmed the cost-effectiveness of Telesecundaria. In terms of effectiveness completion rates in Telesecundaria are the same as general secondary schools (about 79 percent) and significantly higher than technical and vocational schools. A recent unpublished survey showed that Telesecundaria students score lower than regular secondary school students in a standardized test given to seventh graders (lower scores would be expected since these students are from poor rural areas); however, by the ninth grade they score as well on the same tests as regular school students in mathematics and have made up half the difference in language. The most recent estimates show that unit costs in Telesecundaria are roughly the same as those of regular secondary schools in urban areas. The lower student class ratios in Telesecundaria (about 20:1) and annualized technology and production costs (pro-rated for a million students) are offset by larger numbers of teachers and administrative personnel in regular secondary schools. In addition, the costs of establishing regular secondary schools in rural areas would be prohibitive because of the need for teachers specialized in each subject.

"tele-classes" requiring fewer formal classroom hours. A study of Telecurso's cost-effectiveness is also currently underway. Both these programs permit the very best methods and teachers to reach students who would otherwise not have access to a secondary education or might only have access to inadequate services. In short, the potential of mass media (television and, for primary schools, radio) for improving the quality of instruction and improving access appears to have been demonstrated in the region.

While the potential for computers and the Internet to improve the quality of education is very great, high costs, connection difficulties, low teacher quality, and institutional inertia and resistance mean that the use of computers for teaching purposes should, for the time being, be restricted to well-designed pilot projects. Five countries (Brazil, Venezuela, Colombia, Panama, and Peru) are planning to work together on a computer/Internet/media based pilot project to improve science and mathematics teaching in upper secondary schools (Haddad, 1999). The program will seek to: 1) identify the best Internet and media based teaching programs; 2) benchmark learning objectives against international standards such as the International Baccalaureate and the TIMSS curriculum analysis project; and 3) train and integrate teachers into the learning process. It is expected that 50 to 100 schools in three to four countries will participate in the pilot project. It can be expected that within five years costs will go down rapidly, software and teacher training will improve, and widespread use of computers and the Internet for teaching purposes will be feasible.

Programs should also be developed to expose students to computers and related information processing as part of their general education. The impact of a more computer literate population on economic growth may be very high. One study (Wolff) in Costa Rica estimated that the differences in salary between technical and nontechnical workers was so great (about 50 percent) that if only an additional 1 percent of secondary graduates entered technical fields as a result of their exposure to information technology, the social rate of return for investment in

computer education would be positive. At the same time, rather than embarking on large-scale purchases of computers, it may be possible to contract with private institutions to provide computer literacy training. Since many private companies are already doing this outside the formal system, costs would be low and feasibility high. Finally, to prepare for the future, a key policy should be to ensure that future teachers are computer literate.

RETHINKING THE STRUCTURE OF SECONDARY EDUCATION AND ITS RELATIONSHIP TO THE WORLD OF WORK

A separate paper covers in detail issues related to the structures of secondary education and the relationship of secondary education to the world of work (Castro, Carnoy and Wolff, forthcoming). This section summarizes the conclusions of that paper, based on worldwide trends, a changing clientele, and new labor market needs.

In the first place, the gap between the "vocational" and "academic" curriculums needs to be reduced. For example an understanding of the role of technology in society, especially information technology, as well as hands-on understanding of computers, is rapidly becoming part of "general" education. Business and commercial curriculums are becoming more important and more closely linked with academic education. Vocational subjects require greater knowledge of mathematics and better reading skills. All students require increased higher order skills.

In addition, secondary education in the region can no longer afford to overlook the increasingly important role of competencies and skills other than academic ones. Learning goals therefore will also need to include increased capacity for cooperative problem solving and teamwork; civic responsibility in a democratic society; environmental awareness and responsibility; and creativity and innovation. Little is known about how to effectively achieve these new learning goals. An understanding of the role of technology in society, especially information technology, and hands-on understanding of computers, will be necessary. Least cost approaches for imparting this knowledge must be developed. While there is much discussion about new subject matter such as technology awareness and civic education, little is yet known in the region about how to achieve these goals or how to place higher order skills in context so that they become relevant to students' lives.

Preparing less academically inclined students for work will continue to be a difficult issue. Countries will need to identify and experiment with a variety of models. For the academically less talented, higher order skills will need to be embodied in more practical "contextualized" tasks and activities, a pedagogical task which, up to now, no country in the region has attempted and one with which the developed countries continue to struggle. In any event, formal vocational schools are far more expensive than academic schooling, invariably employ poorly qualified teachers and outdated equipment, and take too long considering the increasing importance of general education. Specific job preparation, including vocational training for the nonacademically inclined, needs to move out of the formal system and into nonformal, often private training programs, with modular approaches. This is especially important for the 25 to 50 percent of students who end their formal schooling at the lower secondary level (grade 9) as well as for those students who do not complete ninth grade. A wide variety of experimental linkages with industry (sandwich courses, apprenticeships, secondary schools in factories, etc.) should be tried but these will inevitably cover only a small percentage of all secondary school students and will depend on the peculiar circumstances of each country. This paper does not review in detail these options.

The structure of "general" education can be divided into junior and upper secondary education. Junior secondary education (grades 7 to 9) can be expected to have a unitary curriculum. For most countries there are several options at the upper secondary level, none of which is necessarily superior to the others and which depend to a great extent on history and social context. One option is to take the French approach, emphasizing broad families of occupations, such as

liberal arts, math/science, and commerce. But France continues to track a minority of students into specific vocational schools. Another option is the USA/Canada approach of comprehensive high schools which include academic and vocational tracks. But this approach does not seem to fit into the social and educational history of most Latin American countries and exists only to a limited extent in Colombia's INEMs. Similarly, the German approach of sandwich courses, part-time employment and heavy emphasis on vocational subjects would not work in Latin American countries, except in limited circumstances.

Where enrollment ratios in secondary education are already high and economies are modernizing, technical courses tend to migrate to the post-secondary level, since they require increasing doses of basic mathematics, science, and communication. This solution resolves, at least in part, the problem of the dichotomy between preparation for higher education and occupational training; but it may not yet be feasible for most occupations in low-income, low-enrollment countries such as Honduras and Guatemala. The successful secondary technical schools must be autonomous and closely tied to industry. They are also expensive, offer high quality education and training and tend to be specialized in one industrial branch (electronics, dairy, wines, ceramics, precision mechanics), sometimes including R&D projects.

Argentina has taken the lead in establishing a French approach to the structure of general education and Mexico is now considering it. Brazil is establishing a common track including mathematics, science, language, and social studies to be taught to all secondary school students; however, the subjects will be taught with different emphasis and levels of rigor. Individual schools can be allowed to complete the curriculum with elements of their own choice (30 percent of the hours available), thus blurring the difference between academic and vocational. But Brazil has not yet defined the minimum level of "rigor" for the compulsory subjects nor designed the guidelines for the remaining 30 percent. Peru is beginning a two-year "restricted access" academic senior high school (grades 11 and 12) focussing mainly on college preparation to raise standards, but also in part as a means of lowering expectations or further education for 10th grade graduates. Trinidad and Tobago is eliminating its multiplicity of types of secondary schools in favor of a single model with opportunities for school-based specialization, including magnet schools.

Others countries have sought to reshape technical education, often through locating it at the post-secondary level. Mexico has established an autonomous secondary technical system (CONAFE) in an effort to provide greater flexibility and linkages with industry (see Lee, 1998). Chile has expanded the linkages between a restricted number of secondary technical schools and industry. Many countries have announced that they will "contextualize" academic education so that it is accessible to the new, less academically clienteles entering secondary education, building on experiments and programs already underway in Europe and the United States. But the evidence is not yet in on the relative success of these efforts, which in any event will require major teacher training and upgrading as well as revised textbooks.

There remain a number of difficult issues regarding the preparation of less academically inclined students for work. Many options exist in developed countries, ranging from the German apprenticeship programs to "sandwich" courses between industry and schools, secondary school equivalency programs run within factories, and the United States tech/prep approach. Latin American countries will need to identify and experiment with the most appropriate models, keeping in mind that formal vocational schools can be far more expensive than academic schooling and invariably suffer from poorly qualified teachers and outdated equipment. Furthermore, an excessive preoccupation with "boxes" and restructuring secondary education may divert attention from fundamental issues related to teacher working conditions and quality, and increasing the learning of higher order skills in mathematics, language, communication, etc. Finally, curriculum reform without consensus, training, and adequate materials is self-defeating.

RESEARCH ON WHAT WORKS IN SECONDARY EDUCATION

Education systems throughout the world are notorious for the widespread implementation of new ideas and programs without adequate testing or evaluation. In the United States, for example, less that one percent of the Department of Education's budget is devoted to research (Krueger, 1999). Latin America and the Caribbean are no different when it comes to lack of research on what works in education.

In 1994 a meta-study (Fuller, 1994) examined the small number of studies devoted to what works in secondary education in developing countries, with the following results:

Table 9
Effects of Inputs, Teachers, and Pedagogy on Secondary School Achievement in Developing Countries, as of 1994

Factor	Number of Significant Effects	Number of Studies
Expenditures per student	3	5
Average class size	2	21
School size	1	5
Textbooks	7	13
Supplementary readers	2	2
Instructional media	0	0
Quality of facilities	1	1
School library	3	4
Science laboratory	1	1
School nutrition	1	1
Teachers length of education	5	8
Tertiary or teachers college	8	14
In service teacher training	3	4
Gender (female)	2	4
Teacher experience	1	12
Teacher salary	2	11
Instructional time	11	15
Active, complex pedagogy	2	5
Frequent monitoring of student performance	0	1
Cooperative-learning task structure	2	2
Independence from central government	0	1
Principal's staff assessment	0	1
Principal's training level	1	2
School inspection visits	0	1

Source: Fuller and Clarke, 1994.

Factors measured in more than ten studies, which had positive impacts on learning in more than half the studies, included: textbooks, instructional time, and teachers' level of education. Factors in more than ten studies, which had little or no impact on learning, included: class size, teacher experience, and teachers' salaries. Other factors appeared in too few studies to draw distinct conclusions. This study also emphasized the importance of more qualitative and case study approaches, especially measuring the processes which result in "effective schools," e.g., schools which score higher than expected given the socioeconomic level of students or based on students' knowledge in the beginning of the year.

Based on the above and on reviews of recent research in the region, the research still needed in secondary education includes a wide variety of approaches and subjects. The following is an initial listing of such research.

Measuring What Works through Statistical Analysis

With the increased power of computers, sophisticated quantitative and analytical techniques, including flow analysis and hierarchical linear models (HLM), are now available to most researchers, provided they have adequate training. The new student testing programs in many countries offer a ready source of data for analysis. Statistical techniques can help to tease out complex relationships between inputs, processes and outputs. In particular, they can be used to determine whether new programs have an impact on learning. Natural or structured "quasi-experimental" designs can be set up to compare results of two samples of students with different experiences. Evaluations of this sort should always measure the cost-effectiveness of alternative programs.

School Effectiveness Studies

Since statistical analyses do not provide a full picture of the educational process, they should be complemented by "school effectiveness" studies. These studies measure the critical process variables in secondary schools which lead to higher achievement and retention of students. Schools scoring higher than expected, given the socioeconomic status of their students, or compared with past scores, are examined on a case by case basis to try to identify process characteristics not normally identified in standard statistical analyses. School effectiveness studies elsewhere in the world have led to conclusions on the importance of school director leadership, collaborative teacher efforts, and school/community involvement.

Studies on Teacher Demand, Knowledge and Pedagogy

Studies on teachers should include examinations of the labor market for teachers differentiated by subject matter. For example, there is anecdotal evidence of a shortage of science and mathematics teachers that needs to be documented. If the anecdotal evidence is proved correct, it would have major implications for policies providing incentives for teachers in shortage skill areas. Studies of teacher subject matter knowledge are also important.[9] A comprehensive program of testing of teacher subject knowledge could be instituted in the medium term. Other critical areas include: case studies of teacher training programs, both pre-and in-service, that seem to have an impact; and reviews of teacher incentive systems, teacher careers and incentives and how these can be changed to encourage excellence.

Output and Demand Measurements

A wide variety of analysis is needed on learning and achievement in school as well as on performance in the labor market of school leavers. Interviews with entrepreneurs as well as job analysis can determine the fit between school output and the characteristics of employees with a secondary education. Many studies of this sort have emphasized the importance of non-

[9] One simple approach to this question would be to give the TIMSS tests in math and science, which are now available on the Internet, to a sample of current teachers as well as to newly graduated teachers.

academic skills such as team work, punctuality, and discipline. As noted earlier, most countries are implementing assessment programs. But little is known on the impact of national testing on secondary school teaching and pedagogy, including the extent to which the tests are resulting in increased learning and under what conditions, and the extent to which the tests may be discouraging innovation. Tracer studies on what happens to rural and poorer students who complete primary and/or lower secondary education could determine how many enter the labor market because of lack of access to schools or because of economic need. This could lead to the establishment of specific programs (e.g., distance education) targeted to these students.

Management Studies

Studies on ways to increase time on task in a cost-effective way could focus on the utilization of teachers and classroom spaces, examining the relationships between student-class ratios, student hours per week, and teacher hours per week in a variety of schools and states. There is anecdotal evidence, for example, that student class ratios go down considerably in the last year of secondary schooling because many students drop out; that proliferation of subjects combined with small schools leads to the underutilization of teachers, that teachers have little or no time or preparation or in-school coordination, and that some school regulations encourage the proliferation of "taxi teachers." Reviews of the cost-effectiveness of private schools *vis à vis* public schools are important to clarify the debate over public support of private institutions. In this regard, a review of public oversight of private secondary schools could determine the extent to which such oversight hinders or encourages quality, access, and equity. A related set of studies would cover issues regarding physical facilities in secondary education, including an inventory of the adequacy of current facilities; a study to determine the future model of school construction and equipment to meet curriculum expectations, how these physical facilities should be used, and the cost implications for using different types of school and utilization models, including single shift. Studies of night schools and secondary equivalency programs and their operations could lead to proposals for changes to improve their cost-effectiveness. School management studies could examine the real number of hours of study (rather than the official number of hours); the extent to which there is any sense of coordination and cooperation among teachers and school principals and how the sense of a "school" can be encouraged. Finally case studies of the processes by which institutions change and reforms are implemented can lead to more effective reform strategies.

The Challenge of Meeting Growth and Quality Improvement Targets

ESTIMATING QUANTITATIVE TARGETS AND FINANCIAL AND HUMAN RESOURCES NEEDS

To raise the overall educational attainment level of the general population, improve competitiveness on international markets and reduce inequity in the region, the region's current enrollment ratio of 55 percent will need to be increased significantly. Annex 3 provides a set of illustrative enrollment, financing, and teacher needs projections for countries in the region, based on the current secondary level enrollment ratios in each country, the current and projected school age population, and the definition of secondary education used in each country. Table 10 summarizes the results of the regional projections.

These projections are based on a number of region-wide assumptions about secondary education which may not be appropriate to individual countries. For example, the projections assume that to keep up with social demand as well as economic needs, gross enrollment ratios would need to increase by 20 percent to the year 2010, to about 75 percent. This is consistent with the recommendations of the Santiago Summit, but would be an enormous increase, considering that the enrollment ratio increased by only 4 percent between 1985 and 1995. The projections further assume a 50 percent real increase in unit costs to improve quality. It could be argued that a 50 percent increase in unit costs is inadequate, since this would barely cover improvements in teacher salaries and leave little over for educational materials. The projections assume that the cost of the construction of one student place is $1,000 and that student/teacher ratios will remain steady in each country. It should be emphasized that there is nothing definitive about these projections; rather they are designed to provide rough orders of magnitude about possible objectives for growth and quality improvement in the region. Every nation will need to do its own, far more detailed projections. For example, alternative projections could be made with a higher increase in unit costs and more modest enrollment increases.

Table 10
Summary of Regional Enrollment and Cost Projections

Item	1995	2010
Gross enrollment ratio	55%	75%
School age population	46 million	49 million
Enrollments	25 million	36 million
Unit expenditure	$498	$754
Total current expenditure	$11.6 billion	$16.5 billion
Expenditure as a percent of GDP	0.6%	0.8%
Capital cost needs 1995-2010 for increased enrollment		$11 billion
Student/teacher ratios	15.6	15.6
Teachers	1.8 million	2.6 million
New and replacement teachers to be trained 1995-2010		1.8 million

Even with these caveats, the exercise shows that the region as a whole could increase the gross enrollment ratio in secondary education by 20 percent (equivalent to enrolling 36 million students in the year 2010 compared to 25 million in 1995),[10] and also increase unit costs by 50 percent; at a cost of 0.2 percent of GDP (increasing the percentage of GDP devoted to secondary education from 0.6 percent to 0.8 percent). This improvement is possible not only because of hoped for economic growth (it is assumed that GNP growth would continue at 3.0 percent per annum) but also because the school age population will increase only 8 percent over the period 1995-2010 (from 46 million to 49 million). In a few countries, such as Brazil and Uruguay, the secondary school age population may actually decline. With this decreasing burden of dependency, Latin America has a window of 20 years to invest in social infrastructure. However, because of continued population growth and current low enrollment ratios, some of the poorer counties (e.g., Guatemala, Honduras, and Nicaragua) will not be able to meet these ambitious targets.

The projections assume no change in student/teacher ratios, which currently average 15.6:1 in the region, based on official figures.[11] Assuming this is correct, and assuming replacement needs of five percent per annum, the region would need to train 1.8 million new teachers between 1995 and 2005. In addition, the capital cost for construction of new schools is estimated at over $11 billion, not including the replacement or upgrading of existing schools.

While it appears that Latin America can meet ambitious goals for secondary education, lowered economic growth could put the attainment of these objectives in jeopardy. In addition, it will be important to pay attention to cost-efficiency, especially student/teacher ratios, since a decrease in student/teacher ratios would have an important impact on expenditures.

In any event, the increased numbers of students attending and finishing secondary education and going on to university mean that the average "knowledge" base of the population is rising. This is important, since studies of student achievement show a strong positive relation between additional years of schooling and performance on achievement tests, even when early aptitude is accounted for (see, for example, Knight and Sabot, 1987). The salary incentives in the labor market push individuals and the public sector to invest in more schooling.

While the planning exercise does not differentiate between lower and upper secondary education, it is clear that the quantitative needs of each country vary significantly. The focus of the lower income countries, as well as states within larger countries, will be on expanding access to lower secondary education; for higher income countries, the focus will be on reaching underserved populations in lower secondary education and on overall expansion of upper secondary education.

The increase in enrollment in each country will depend on its socioeconomic conditions and outlook, as well as on the rigor with which countries identify cost-effective solutions. Most countries in the region have already embarked on secondary school expansion programs.

Along with quantitative increases, countries will need to implement proactive policies targeting the poor and underserved. These policies could include: 1) targeted school construction in underserved urban slum and rural areas; 2) more recurrent funding and assistance, including teacher incentives, to schools in rural and urban slums; 3) financial and other incentives for motivated teachers and principals to work in underprivileged areas; 4) distance education for hard to reach groups (rural people and young adults); and 5) in some cases, direct financial support to lower income students to cover the cost of foregone wages (in the form of, say, textbook subsidies). Most countries are targeting their public school construction efforts, and a few (Mexico,

[10] In Brazil the length of secondary education is three years. If secondary education were six years in length, then an additional several million students would need to be enrolled in the region.

[11] It is possible that many teachers in Brazil, Argentina, and Venezuela are double counted because they may be teaching in two different schools.

El Salvador, Brazil) are using distance education for hard to reach populations. But very few are providing increased funding, including monetary and other incentives to qualified teachers, to teach in urban and rural slums. El Salvador is initiating a program of financial support for needy secondary school children.[12]

SEEKING COST EFFECTIVENESS IN SECONDARY EDUCATION

Given the region's recent economic performance, there is not necessarily a contradiction between quality and quantity. In the first place, many improvements in quality are not costly since they require more effective input mixes rather than vastly increased unit costs. In the second place, it is entirely possible that the region can achieve quantitative and qualitative targets if economic growth continues at close to the pace reached between 1990 and 1996 of 3.2 percent per annum.[13] Qualitative targets are not incompatible with quantity not only because of better economic performance, but also because of the demographic transition now taking place which has led to a slowdown in the rate of growth of the school age population. In addition, qualitative improvement may well reduce quantitative pressures since higher quality should reduce repetition rates.

Nonetheless, it is important to seek the most cost-effective mixes of inputs in order to achieve both quantitative and qualitative goals. Applied research is needed to begin to understand these issues but, as noted above, research on what works in terms of achievement and retention (to say nothing of labor market performance) is just beginning. Even with the current paucity of research and good indicators, it is possible to identify a number of measures that would reduce relative costs including policies related to teacher utilization, student contact hours, repetition, distance education, and the role of private education.

Defining Policies on Student/teacher and Student Class Ratios

Student/teacher ratios are by far the most important element affecting unit costs. In nearly all Latin American countries it appears that student/teacher ratios are not excessively high; but there is a tendency to reduce student/teacher ratios without any explicit policy or guidelines. At the same time, most international studies have shown that within a class size range of 20 to 40 students there appear to be little differences in learning. In fact, Korea, with among the highest scores on international tests, has had for many years a class size of 40 students in secondary education.

Student/teacher ratios are based on a combination of student class size, number of student hours per week and number of teaching hours per week. For example, Table 11 shows three ways to achieve a ratio of 16 students per teacher. The number of teaching hours per week could range from 15 to 31 and the student class ratio could range from 18 to 36, while using the same number of teachers.

It will be important to keep track of all of these elements and to establish national, regional, or local guidelines on the combination which is most appropriate for achieving the maximum learning at the minimum cost. This will also require better statistics on teachers, especially those working at more than one school. A wide variety of policies can be considered. For example, there is anecdotal evidence that many teachers spend too many hours per week teaching, usually in different schools, with a resulting lack of time for classroom planning. Agreements could be reached to increase class sizes, ensure that teachers work in only one school, and utilize the savings from larger classes to provide teachers with paid, in-school planning time (similar to alternative C above). In addition, average school size, restrictions with regard to subjects teachers are permitted to teach, and

[12] But monetary rather than in-kind subsidies are risky since they may lead to expectations of expensive entitlements for the less than needy.

[13] Economic growth will be nil in 1999 but should rebound in the following years.

Table 11
Policy Alternatives in Teacher Utilization
Three Ways of Reaching a Student /Teacher Ratio of 16:1

	Alternative A	Alternative B	Alternative C
Student Hours Per Week	30	35	34
Teaching Hours per Week	20	31	15
Student Class Size	25	18	36
Student/teacher Ratio	16	16	16

policies on minimum and maximum hours of teaching in single or multiple schools can also have an impact on student/teacher ratios.

Alternative Means of Increasing Student Contact Hours

While in many Latin American countries (but not in the English-speaking Caribbean) it is important to increase the hours students spend actively learning in secondary school, a vast and expensive construction program (doubling the number of physical facilities to eliminate double shifting), as Chile has recently undertaken, is not the only option. In the first place, increasing the length of the school year will require no increased capital expenditure and could have a major impact on learning. Ending the habit of long strikes will also achieve similar goals with little incremental costs. In addition, time on task can be increased by simply giving students more homework, which has been shown in many studies to have a positive impact on student achievement. There is already adequate time, even on a double shift (four and a half hours per day—7:30-12:00, 12:30-5 pm) for direct academic instruction. Additional time will have to be found for the other elements of a well rounded secondary education—sports, art, music, social relationships, and community service, which could be undertaken outside school buildings. In short, in most countries it is appropriate to define a mix of cost effective policies to increase time on task. Single shift with full facilities is an option only where economic growth is long standing and other social goals are affordable. Box 3 provides an example of a program undertaken in Uruguay to rationalize teacher utilization as well as to increase student contact hours.

Box 3
Teacher Rationalization in Uruguay

In 1996 Uruguay implemented a program of rationalization of school time and teacher utilization that nearly pays for itself. The objective was to increase the number of hours in school of both students and teachers. Specifically, Uruguay increased the number of daily hours in school from three hours and 45 minutes to five hours and 30 minutes, the length of each class rose from 35 to 45 minutes, and the time for sports and recreation from 15 minutes to 60 minutes, with the result that all three shift schools became two shift schools serving the same number of students. The increased time for teachers in school resulted in a 12.5 percent increase in teacher salaries, as well as increases in the time for support staff. A bonus system was instituted to reduce absenteeism. Savings were achieved through modest increases in the student class ratios (the number of students per class was increased from 29:1 to 31:1), reducing the number of administrative staff (since double rather than triple shifts were administered) and expected reductions in teacher absenteeism. (IDB, 1996)

Reducing Repetition

Policies which reduce repetition and dropout rates will also lead to major savings on recurrent costs. Secondary school repetition may be serving the same negative purpose that it does for primary education, as a "substitute" for pedagogical quality and for an understanding of students' learning problems. As in primary education, students who repeat are much more likely to drop out. The first step is to develop an information system to identify the extent and then the causes of repetition. Brazil has made enormous progress in measuring repetition and flow rates, but many other countries are lagging.

Using Distance Education

As noted, distance education has been shown to be a cost-effective means of extending coverage at low costs than traditional secondary education to the underprivileged and underserved, especially in rural areas, but also for adults. Mexico's Telesecundaria program, described below, has a long history of providing access in rural areas to secondary education at lower costs per student than conventional secondary education. Brazil's Telecurso 2000, which has not yet been fully evaluated, is directed to young adults who are seeking secondary school equivalency. Distance education around the world has also been shown to be a cost-effective means of in-service teacher training.

Benefiting from Private Investment in Secondary Education

Public secondary education will need to remain mainly free, to improve quality, and to attract the middle class back. At the same time, governments can rely on private education to reduce the burden on public funds as well as to provide diversity, increased choice, and, possibly, greater cost effectiveness. A wide variety of options (buying places, vouchers, teacher secondment) are available. In terms of capital expenditures, efforts could be made to increase the access of private institutions to credit markets for school construction, and the government could restrain from building public schools in middle- and upper-class localities. Chile and Colombia have already undertaken broad experiments in secondary level vouchers, and the private Fe y Alegría programs in several countries have benefited from government support with very positive and cost-effective results. Support and regulation of private education must be designed to encourage efficiency as well as to ensure equity. To illustrate the complexity of issues with regard to regulation of private secondary schools, one study on Chile (Carnoy, 1998) showed that private secondary school vouchers increased social inequities; in addition, as levels of public funding have increased, the cost advantages of private schools in Chile decreased.

Systematically Measuring Costs

Finally, while it is always difficult to measure the effectiveness of quality enhancing measures, it is relatively easy to measure costs, although it is rarely done. The costs of proposed quality enhancing interventions should be measured. Table 12 shows estimates of the costs of several secondary school interventions in a typical Latin American country.

CREATING PARTNERSHIPS AND A SYSTEMS APPROACH

Governments must be prepared to fund much of the capital costs associated with expanding access to secondary education, including the construction of physical facilities, provision of equipment, and teacher training. Equally, governments must commit additional resources to fund current expenditures. Given the enormous needs, governments must act in partnership with other stakeholders, especially parents, private educational institutions, labor unions, and the private productive sector to meet financial needs, raise learning standards, revise curriculum and improving working conditions. It will be particularly important to enlist teachers' unions in the reform efforts, to share financial responsibility with private institutions and with parents, and to seek advice from businessmen on the desired characteristics of secondary school graduates who will be entering the labor force.

Table 12
Estimated Costs of Selected Interventions in Secondary Education

Intervention	% Increase in Unit Expenditures (est.)*
One hour per week access to computers	13
Raise teachers salaries by 10%	9
Free school lunch for all	30
Free textbooks to all	13
One additional hour of schooling per day	15
MIS to identify low performing schools	0.3
Four weeks of in-service training	10
In-school vocational training	100
Increase homework given to students	0
Single shift school construction and 6 hrs of instruction per day	43**

(*) It assumes 20:1 student/teacher ratio and $400 expenditures per student per year.
(**) Including annualized cost of school construction.

Secondary school expansion should *always* be accompanied by government and stakeholder attention to reforms that improve quality, increase equity and efficiency, better school management, and are more relevant to changing clientele, labor market and social needs. The specific nature and content of these reform efforts will depend on country conditions. Among the elements to which governments and stakeholders must provide most attention are the following:

- Redefining the model of secondary education in accordance with the new demands of the labor market and the clientele. This includes new approaches to technical/vocational education and defining a new common core of curriculum. However, curriculum reform must not be an end in itself and should be integrated into a wide variety of policies that promote quality, equity, and efficiency.

- Attention to cost effective mixes of inputs to achieve quality improvement goals, including appropriate student/teacher ratios, inexpensive school construction, optimum school sizes, distance education, partnerships with private institutions, and funding basic school inputs like libraries, science equipment and copying machines before the large-scale purchase of computers.

- Strategies to attract higher quality teachers to the profession; reform teacher training; provide in-service training that is hands-on, practical, and classroom based; adaptation and testing of new and better teaching materials; and provide greater autonomy to schools while also making them accountable for the results;

- Attention to equity, that is, explicitly designed policies to provide school places of good quality to lower income students, as well as developing outreach programs for young adults seeking secondary school equivalency.

- Institutional capacity building and sustainability; client, beneficiary, and stakeholder ownership; knowledge about the issues and options of education reform and their relationships to the larger socioeconomic context; simple but robust monitoring and evaluation instruments; a process rather a blueprint approach for education reform; better assessment, statistics, applied research and feedback to stakeholders; and pilot projects, experimentation and innovation rather than wholesale implementation of untested ideas.

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Annexes

Annex 1
Sector Studies of Secondary Education in the Region

A number of detailed country studies of secondary education have recently been undertaken which provide analyses of the situation on a country-by-country basis, mainly using statistical approaches (e.g., flow models, financing and costs, enrollment ratios, multivariate statistical analysis ofcorrelations, etc.). World Bank and IDB appraisal and sector reports summarize the results of these studies, which are described below.

In the Brazilian state of Paraná repetition in 1995 averaged 17 percent in the ninth and tenth grades, and 29 percent of students dropped out in the first year of secondary education (IDB, 1996). Only 47 percent of beginning students completed secondary education and they took an average of 4.7 years to complete the three-year course. In 1995, 40 percent of students were enrolled in general education. Fifty-eight percent were enrolled in teacher preparation and commerce. Sixty-eight percent of students attended secondary school at night. Eighty percent of teachers were university graduates (*licenciados*), textbooks were virtually nonexistent, libraries were severely lacking, and computers were unavailable to students. Not one public secondary school was actually built for that purpose. Lack of maintenance was endemic. Most schools enrolled less than 400 students. In 1994, $133 was spent per student compared to $237 at primary levels and $2,631 at the state's higher education level. Less than $8 was spent on nonsalary recurrent expenditures.

A review of public secondary education in Uruguay in 1996 (IDB, 1996) revealed that only eight percent and 11 percent of public secondary school students passed national mathematics and Spanish achievement tests, compared to 40 percent and 50 percent of students in private schools. Repetition was estimated at 11 percent and dropout at 13 percent for lower secondary school. Public schools mainly served the lower and middle classes. Thirty-six percent of students in public institutions were in the lowest income quintile, while only seven percent were in the highest quintile. The curriculum consisted of 12 subjects within a school day lasting no longer than 3.5 hours. Many schools ran three and even four daily sessions. Because of the structure of the system teachers were required to divide their time among several different schools. Teacher salaries averaged $400 per month. School management was highly centralized. Student/teacher ratios were a relatively low 16:1 (20 hour teaching load). There was evidence of significant teacher absenteeism. Teacher pay was not based on qualifications, merit, or performance. There was no monetary advantage to being a school principal. Only 31 percent of teachers were qualified.

Studies of secondary education in Colombia in 1992 (World Bank, 1992) identified low enrollment ratios (46 percent) as a key problem. Most public secondary schools operated on two and three shifts. Because of a lack of places, the government initiated a voucher system for students to attend private secondary schools. Repetition rates averaged 16 percent. In many rural areas, secondary education did not extend beyond grade nine. The majority of Colombia's teachers had a university degree. While textbooks were of reasonable quality, most public secondary students had only one or two textbooks. Libraries were extremely limited, laboratories were usually unavailable or underutilized. On average, private secondary schools cost 10 percent less per student than public schools (Jimenez and Lockheed, 1995). Even after controlling for social class and selection discrimination, students in private schools in Colombia had higher achievement than those in public schools.

Studies of secondary education in Chile undertaken in the early 1990s (summarized in World Bank 1995) identified inadequate linkages of technical vocational schools with the productive sector and 12 percent repetition rates, resulting in an average time of 5.3 years to complete the four year course. Public school students answered correctly only 39 to 48 percent of the questions on a standardized Spanish test based

on the official curriculum and only 20 to 29 percent of the questions on a mathematics test, compared to 40 to 50 percent for private schools. Frontal teaching, drilling, rare use of textbooks, poor presentation of materials, and inadequate integration with students experiences were endemic. Textbooks were inadequate and often unused. Ninety-six percent of upper income students attend secondary school compared to 52 percent of rural school children. Compared with other countries in the region, the gross enrollment ratio in Chile was high (76 percent).

A review of secondary education in Mexico (IDB, 1997) showed that demand for middle school (grades 7 to 9) was increasing rapidly but there were over 10 million Mexicans without nine years of education, of whom 10 percent wished to continue their studies. Large numbers of students still dropped out of middle school. Night school programs were particularly inefficient, with only 51 percent of the cohort eventually graduating. The demand for high school education was expected to rise sharply by 2004.

A study of secondary education in El Salvador (World Bank, 1997) found that enrollment rates were only 29 percent, compared to 53 percent for the region as a whole. Secondary school services were concentrated in urban areas, especially in San Salvador. Lack of financial resources contribute to low enrollment. Among those not in school, some 37 percent had to work. Direct costs of secondary education in public schools were estimated at US$229. Scores on a national achievement test averaged 45 percent for mathematics and 48 percent for language. There were no adequate accreditation and quality control mechanisms for private schools. More than 90 percent of expenditures went to salaries. The secondary system in 1997 was highly centralized, in contrast with the decentralized primary school system.

A study in Colombia (Pineros and Rodríguez, 1998) of students who took the ICFES examination for entrance into higher education, at the end of secondary school grades, used a "Hierarchical Linear Model" to identify the impact of individual, school and process variables on student achievement. With regard to student characteristics, the following items had positive impacts on student learning: 1) student's socioeconomic background, and 2) students' persistence in one school. The socioeconomic background has a stronger impact on language scores than on mathematics scores. With regard to school variables, 1) private schools had a much greater variance than public schools; 2) after controlling for the socioeconomic background, public schools scored higher than private schools; 3) the school accounts for between 15 percent and 18 percent of the variance in private schools and between 12 percent and 16 percent of the variance in public schools; 4) the higher the amount of payments made by parents in public schools the lower the scores (this is explained by the fact that the less prestigious public schools appear to require more parental assistance); 5) the amount paid in private schools had no impact on scores; 6) students in single shift full-time schools scored higher than students in double shift schools (these students spent 30 percent more time in school); the availability of workshops had little effect on student scores; and 7) provision of textbooks had no impact on scores (but it should be noted that in nearly all cases students purchased their own textbooks).

A study undertaken in Brazil (Herrán and Rodríguez, 1999) provides the most recent results and most sophisticated analysis. The study concludes that demand for secondary education largely depends on continued improvement of flows at the primary level. Different Brazilian states are at different stages which suggests different degrees of readiness for secondary education expansion and different types of investments. Although universal access to primary education has been largely achieved, Brazil is far from achieving universal basic education (grades 1 to 8). Only one in two Brazilians actually finish the 8th grade and they take 11.2 years to do so. The main challenge remains to continue to reduce repetition rates. At the Ensino Medio level, the main challenge is dropout, not repetition. Dropout is strongly linked to large grade-age gaps (result of high repetition in primary) and to the inadequacy of teaching methods and materials for young working adults (relevance and quality of secondary education). The expected trade-off between study and work and the rising opportunity cost with age do not seem to be among the main factors associated with secondary dropout. This is so because the majority of students work and stu-

dy simultaneously (over 60 percent attend night schools), and there is a statistically signifficant effect of rising educational demands from the labor market and higher wages for higher education acting as an "accelerator" for demand for secondary education. Family variables, notably parent's education, are strong predictors of the educational progress of their children. It would take an additional R$4,000 per capita to compensate for the effect of a one year difference in parents' education on the probability that their children will complete secondary education. This means that income support programs, as a tool for reducing droput are costly and of limited effectiveness, given the very poor quality of public secondary education available to the poor (particularly in night schools). The benefits of "universally" designed programs to improve educational outcomes do not reach the poor adequately (for example, in school snacks). The notable exception is the *livro didatico,* a program which is both well targeted and effective in improving learning outcomes. Most of the innovative experiences documented among secondary schools so far are of a narrow pedagogical scope. There is little innovation in terms of school management, outside of a few private schools. Students in "night" schools, which account for 60 percent of enrollment, score much lower on national achievement tests than those in day schools; boys score higher than girls in mathematics; younger students score better than older students;students in daytime academic and technical schools score highest. Private schools do much better than public schools but, based on available data, all of this effect can be explained by higher socioeconomic status of students and better equipment and learning materials.

Annex 2
Secondary Education Reform in Europe and the United States

EUROPE

In 1996, the Council of Europe, a cooperative association of nearly all European countries, commissioned a series of studies on secondary education reform in its member countries. In 1999, the Committee of Ministers adopted a statement on secondary education. The statement begins with the assumption that a quality education experience must be provided to all children up to the age of 18 or 19. It then focuses on: 1) a concern with the implications on secondary education of the speed and unpredictability of economic change, a labor market where job security can no longer be guaranteed, the undermining of social cohesion, the need for greater awareness of the environment, and the new importance of information technology; 2) better links and a new balance between general education and technical and vocational education and between acquiring knowledge and specific skills and developing more general key competencies; 3) considering the school rather than the class as the basic educational unit, and reorganizing the school around a multidisciplinary team open to the outside world; 4) an emphasis in curriculum reform on political and social competence, abilities for living in a multicultural society, proficient oral and written communication, competence in the information society, and the ability to learn throughout life; 5) focussing in teacher training on interdisciplinary studies, interpersonal and social relations, developing capacities to assist students in assimilating information, developing key knowledge competencies, evaluation and self-evaluation, continuing education, and special attention to training of school heads and administrators; 6) an emphasis on the process of reform, with permanent evaluation and feedback from all stakeholders; and 7) establishing a specifically European dimension of schooling, including a sprit of openness to the rest of the world, understanding of a common heritage, and democracy (Kallen, 1997, and Council of Europe, 1999).

Italy has recently initiated a wide variety of reforms designed to catch up with the rest of Europe in terms of enrollment ratios; focus on learning, including establishing national standards and testing;and rationalize its complex system of academic and vocational schools (Corriere della Sera, 1999).

UNITED STATES

Efforts in the United States focus on increasing levels of achievement and learning but also include a concern with civic education and with providing more meaningful education experiences to disadvantaged and less academically gifted children.

The US performance on the TIMSS math and science tests has been particularly disappointing at the secondary school level. While fourth grade students perform reasonably well, eight graders fall behind and twelfth graders fall even further behind. Especially in lower secondary schools, few new topics are introduced and existing ones are not covered in depth. Over 40 percent of high school students never take basic algebra (Schmidt, et al, 1998).

A study (Bishop, 1996) was undertaken of the causes of low achievement in US high schools compared to France, the Netherlands, and Britain. The study concluded that one of the main causes of low achievement was the lack of an external subject specific examinations providing grades reported to students and teachers and reported in the students secondary school certificates. In the United States, students were ranked relative to their classmates rather than against an external criterion. Subjects were taught at vastly different levels, but the results were not well signaled to interested parties. The study showed that

achievement scores in New York state were higher than in most other states because New York did have an external examination (the Regents). It showed that teachers in the United States had lower pay, worse working conditions (more hours in schools) and lower subject matter mastery than their counterparts in Europe.

The study suggested the following actions to raise achievement scores in US high schools: 1) set external subject specific examinations that supplement but do no displace teacher assessments of grades; 2) provide open parental choice of upper secondary schools with money following students; and 3) require high entry standards for teachers sustained by high wages and good working conditions. Other studies, including TIMSS, have shown that time on academic tasks is low.

Current reform efforts in the United States include raising standards at all levels of secondary education, with a focus on higher order skills in mathematics, language, and communication; identifying practical ways of teaching civics, and providing additional help to minority and disadvantaged students to reduce dropout and ensure that they learn at levels similar to those of more privileged students, in part through embodying mathematics and communications skills in practical programs and activities (e.g., the tech/prep approach).

Annex 3
A Planning Exercise for Secondary Education in the Region[14]

This annex presents three planning exercises that highlight three secondary education subject areas in Latin America and the Caribbean: 1) enrollment; 2) current and future costs; and 3) teacher needs.

ENROLLMENT RATES

Cross enrollment and net enrollment rates were compiled from the UNESCO *World Education Reports*. It should be noted that countries differ greatly in their definitions of secondary education. For most countries in the region, the official duration of secondary education is between four and six years; in Brazil and El Salvador, it is three years and in Jamaica it is seven years.[15] As shown in Table 1, as of 1995 the region lagged behind the OECD and the developing nations of East Asia in gross enrollment ratios, with the region averaging 55 percent compared to around 100 percent for OECD countries. The region improved its gross enrollment slightly (by 4 percent) between 1985 and 1995. Net enrollment ratios, when available, are significantly lower than gross enrollment ratios, suggesting the enrollment of many overage youths in secondary education. The difference is greatest in the case of Brazil, where the net enrollment ratio is 26 percent lower than the gross enrollment ratio. The main explanations are repetition in primary education and/or secondary education, and voluntary late-entry or part-time study. Variations in enrollment rates across countries reflect differences in the demand for education and in the extent of compulsory schooling.

At the Summit of the Americas held in Santiago de Chile, a goal was set for achieving 75 percent regional enrollment in secondary education by 2010. Meeting this target would mean an increase of 20 percent from the 1995 regional average. In Table 1, a 20 percent increase in the gross enrollment ratio was projected for each country for the year 2010. This increase would enable LAC to compete more closely with OECD and Asian countries. In order to achieve such an increase in secondary enrollment, there needs to be a significant improvement in completion rates for primary education, which is in fact taking place throughout the region. For example, a review of recent and projected improvements in primary school efficiency in Brazil and Mexico suggests that demand for secondary school places would be such that a 20 percent increase in secondary enrollment ratios could be called for if financially feasible.

To predict future enrollments in the region, the applicable *school age population* was used. Numbers were compiled using the actual "expected" populations for 1995, 2005 and 2010 from the United Nation's publication, *The Sex and Age Distribution of the World Population*. The two most appropriate age categories (10 to 14 and 15 to 19) were adopted. *Relevant population according to official duration* was derived by dividing the total school age population figures by the number of years of official secondary school duration as outlined in the first column of Table 1. For the region as a whole, this figure will increase from approximately 46 million in 1995 to 49 million in 2010. For 1995 enrollment, the 1995 gross

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[14] This annex was prepared by Norma Garcia and Julissa Reynoso.

[15] For comparative purposes, when the Brazilian three-year secondary school system is adjusted for 6 years, Brazil's 1995 gross enrollment ratio increases from 45 percent to 68 percent. Enrollment figures for this estimate were compiled using official 1995 figures from the Brazilian National Institute for Studies and Research on Education (INEP) and the Ministry of Education (MEC). The author selected the last three years of primary education and calculated the 1995 enrollment for a total of six years of enrollment. That figure of 13.9 million students was divided by the relevant population for a six-year school system (in this case 20.5 million). A 68 percent gross enrollment ratio dramatically alters the real numbers in current and future enrollments. Furthermore, using this figure the 1995 regional weighted average would be closer to 60 percent, a 5 point increase.

enrollment ratios were multiplied by the 1995 relevant population figures; for the 2010 enrollment projections, the 2010 20 percent increase target ratios were multiplied by the 2010 predicted relevant population. On the basis of these calculations, the projected total enrollment increase is of approximately 11 million students by the year 2010, with Brazil and Mexico accounting for the largest increase (1.4 and 2.8 million, respectively). It should be noted that in nearly all countries the secondary school age population will increase slowly between 1995 and 2010.

CURRENT AND LONG-TERM COSTS

Overall spending on secondary education is based on the number of students enrolled. Almost all the current expenditure per pupil numbers were obtained from UNESCO's *World Education Reports*; however, data for Venezuela, Brazil and Peru were not available in these reports and national ministries of education statistics were used instead. As shown in Table 2, expenditures range from $67 in Guatemala and $73 in Dominican Republic, to $615 in Brazil, $664 in Mexico and $964 in Argentina, suggesting that, on average, the more affluent countries spend relatively more per student. Some exceptions are Venezuela, which spends $207 and Cuba, with a spending of $451 per student.

Total current expenditure was derived by multiplying current expenditure per pupil by current enrollment. The regional total amounts to $11.6 billion. Using the proposed 20 percent 1995-2010 enrollment increase outlined in the previous section, along with an estimated $1,000/student capital cost, an estimated capital cost for enrollment increase was derived. Based on the current expenditure per pupil and the 1995-2010 enrollment increase figures, the estimated cost for enrollment increase at current expenditure was calculated. The expenditure per pupil for 2010 was calculated by increasing the current expenditure per pupil by 50 percent, estimating an average annual growth of 3.0 percent for the 1995-2010 period.

Using the total current expenditure for the region, the region currently allocates approximately 0.6 percent of its GNP (current regional GNP is $1,804 billion) towards secondary education. In order to keep pace with the increased enrollment and increased expenditures per student, the region would have to allocate an additional 0.2 percent of its GNP by 2010, assuming an annual average 3.0 percent economic growth rate for the 1995-2010 period. This would certainly be achievable. These increased funds would minimally cover higher teacher salaries and more equipment, library books, and technology. In most countries it would not be necessary to lower student/teacher ratios. Indeed, provided that current economic and political transitions continue, these figures are feasible targets.

TEACHER NEEDS

Education ministries and local decisionmakers need to consider a number of trade-offs in setting education budgets and determining the volume of educational activity. In the case of teaching, decisions must encompass teacher salary levels, size of classes, designated hours of teaching time and intended instruction time planned for students. The amount spent on education and the result in terms of the intensity of student to teacher contact will depend on what choices are made for each of these factors. Some of these variants are addressed in the Table 3.

The 1995 student/teacher ratios are found in UNESCO's *World Education Reports*. Data for all countries was not available and in those cases a default number of 18, the simple average for the region, was used (the weighted average is 15.6 due to the lower averages for Brazil, Mexico and Argentina). In the case of Argentina and Venezuela, ratios were 8:1; this may partly be due to double-counting of teachers who may teach in two different schools. Using current student/teacher ratios, the current number of teachers was calculated using the given 1995 enrollment numbers. The total number of existing teachers in the region for 1995 was 1.8 million. The additional teacher need by 2010 estimates the number of additional teachers needed per country to maintain current student/teacher ratios in each country. Numbers were derived

by dividing 1995-2010 enrollment increases by current student/teacher ratios. The replacement teacher need by 2010 estimates the number of replacement teachers required to meet current existing number of teacher figures, given a replacement rate of 55 percent. Total teacher needs by 2010 are the sum of the additional teacher need and replacement teacher need. This is the number of teachers who will need to be trained over the 1995-2010 period.

The figures indicate that the region needs an additional 1.8 million teachers to keep up with the predicted increase in enrollment and maintain current student-teacher ratios. Teachers are the mediators between the objectives and results of the secondary school system. Hence, it is imperative to focus on this component of education policy and funding to train this large number of teachers adequately and effectively and to remunerate them appropriately.

Table 1
Enrollment

Countries	Gross Enrollment Ratio (% of Relevant Age Group)		Net Enrollment Ratio (%)		1985-1995 Difference in Gross	2010 20% Increase Target in Gross	School Age Population (1,000s)						Relevant Population According to Official Duration (1,000s)			Enrollment (1,000s)		1995-2010 Enrollment Increase (1,000s)
							1995		2005		2010							
	1985	1995	1985	1995			Age 10-14	Age 15-19	Age 10-14	Age 15-19	Age 10-14	Age 15-19	1995	2005	2010	1,995	2,010	
7-Year Duration		1131%																
Jamaica	59%	66%	57%	64%	7%	86%	247	242	265	231	262	265	342	347	369	226	317	91
France	90%	110%	82%	92%														
Luxembourg	75%	74%	66%	n/a														
New Zealand	85%	117%	84%	93%														
Spain	98%	118%	n/a	94%														
United Kingdom	84%	134%	80%	92%														
6-Year Duration																		
Colombia	48%	67%	n/a	50%	19%	87%	3,815	3,619	4,254	4,107	4,193	4,216	4,460	5,017	5,045	2,988	4,389	1,401
Cuba	82%	80%	67%	82%	-2%	100%	772	767	781	860	705	772	923	985	886	739	886	147
Ecuador	58%	50%	n/a	n/a	-8%	70%	1,340	1,245	1,427	1,373	1,446	1,422	1,551	1,680	1,721	776	1,205	429
Guatemala	19%	25%	n/a	n/a	6%	45%	1,360	1,168	1,729	1,525	1,908	1,714	1,517	1,952	2,173	379	978	599
Haiti	18%	22%	n/a	n/a	4%	42%	845	732	1,023	919	1,102	1,004	946	1,165	1,264	208	531	323
Mexico	57%	58%	46%	46%	1%	78%	10,385	10,285	10,858	10,351	10,826	10,604	12,402	12,725	12,858	7,193	10,029	2,836
Panama	60%	68%	48%	57%	8%	88%	277	259	296	287	293	291	322	350	350	219	308	90
Paraguay	31%	38%	n/a	33%	7%	58%	602	483	726	668	766	724	651	836	894	247	519	271
Uruguay	71%	82%	56%	n/a	11%	102%	258	276	259	255	264	258	320	308	313	263	319	57
Australia	80%	147%	78%	89%														
Belgium	102%	144%	89%	98%														
Canada	99%	106%	88%	92%														
Denmark	105%	108%	83%	86%														
Japan	95%	98%	95%	96%														
Korea, Rep.	92%	101%	84%	96%														
U.S.A.	97%	99%	91%	89%														
5-Year Duration																		
Argentina	70%	77%	n/a	59%	7%	97%	3,285	3,350	3,427	3,357	3,500	3,433	3,318	3,392	3,467	2,554	3,363	808
Costa Rica	40%	50%	34%	43%	10%	70%	371	336	419	407	428	419	354	413	424	177	296	120
Honduras	37%	32%	n/a	27%	-5%	52%	728	624	909	810	959	905	676	860	932	216	485	268
Nicaragua	34%	47%	19%	26%	13%	67%	561	475	630	577	686	628	518	604	657	243	440	197
Peru	63%	70%	49%	53%	7%	90%	2,715	2,582	2,839	2,803	2,842	2,827	2,649	2,821	2,835	1,854	2,551	697
Trin. & Tob.	83%	72%	71%	65%	-11%	92%	149	128	110	132	107	109	139	121	108	100	99	0
Ireland	98%	114%	n/a	n/a														
4-Year Duration																		
Bolivia*	39%	37%	27%	29%	-2%	57%	876	783	1,099	961	1,171	1,085	664	824	902	246	514	269
Chile	67%	69%	n/a	55%	2%	89%	1,287	1,212	1,456	1,418	1,431	1,448	1,000	1,150	1,152	690	1,025	335
Dom. Rep.*	51%	41%	n/a	22%	-10%	61%	855	932	804	905	918	911	715	684	732	293	446	153
Venezuela*	24%	35%	16%	20%	11%	55%	2,469	2,263	2,746	2,670	2,783	2,738	1,893	2,166	2,208	662	1,215	552
Hungary	72%	81%	70%	73%														
Poland	78%	96%	73%	83%														
3-Year Duration																		
Brazil†	35%	45%	14%	19%	10%	65%	17,480	16,662	15,663	16,907	15,225	15,605	10,243	9,771	9,249	4,609	6,012	1,403
El Salvador	25%	32%	n/a	21%	7%	52%	654	729	752	691	792	749	415	433	462	133	240	108

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WEIGHTED AVERAGE		55%				16.03												
SIMPLE AVERAGE	49%	53%			4%	73%	2,333	2,234	2,385	2,373	2,391	2,369	2,092	2,209	2,227	1,137	1,644	507
	Average	**Average**	**Average**	**Average**	**Average**	**Average**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
W/O BRAZIL OR MEXICO	49%	53%			4%	73%	23,466.00	22,205	25,951	24,956	26,556	25,918	23,371	26,119	13,213	13,213	20,127	6,914
ANDEAN	46%	52%			5%	72%	11,215.00	10,492	12,365	11,914	12,435	12,288	11,216	12,508	6,526	6,526	9,874	3,348
CARIBBEAN	59%	56%			-2%	76%	2,868.00	2,801	2,983	3,047	3,094	3,061	3,065	3,302	1,566	1,566	2,280	714
MEXICO AND CENTRAL AMERICA	39%	45%			6%	65%	14,336.00	13,876	15,593	14,648	15,892	15,310	16,203	17,348	8,560	8,560	12,777	4,217
SOUTHERN CONE	55%	62%			7%	82%	22,912.00	21,983	21,531	22,605	21,186	21,468	15,531	15,384	8,363	8,363	11,237	2,874
TOTAL							**51,331**	**49,152**	**52,472**	**52,214**	**52,607**	**52,127**	**46,015**	**48,604**	**49,001**	**25,015**	**36,168**	**11,153**

(*) Change in duration between time frames
(†) When numbers are adjusted for a 6-year secondary schooling duration in Brazil, the 1995 gross enrollment ratio is 68%.
Italics indicate 1992 figures.

Definitions:
Gross Enrollment Ratio (% of Relevant Age Group) is the total enrollment in second-level education, regardless of age, divided by the population of the age group which officially corresponds to secondary schooling.
Relevant Population According to Official Duration is the population in thousands of the age group which officially corresponds to second level general education. Statistics were derived by dividing the total school age population indicated in previous columns by the number of years of official secondary school duration as outlined in the first column.
Enrollment is the total number in thousands of students enrolled at the secondary level. Numbers were derived by multiplying the relevant population according to official duration by the gross enrollment percentage.

Sources:
UNESCO, World Education Report, 1995; 1998. World Bank, World Development Indicators, 1998 CD-ROM. United Nations, The Sex and Age Distribution of the World Populations, 1996.

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Table 2
Current and Long-Term Costs

Countries	Current Expenditure per Pupil (US$)* 1995	Total Current Expenditure ($1,000s)	Estimated Capital Cost for Enrollment Increase at $1000/student ($1,000s)	Estimated Cost for Enrollment Increase at Current Expenditure ($1,000s)	Expenditure per Pupil 2010 (US$)*
7-Year Duration					
Jamaica	$378	$85,397	$91,336	$34,525.01	$567
6-Year Duration					
Colombia	$210	$627,578	$1,401,030	$294,216.30	$315
Cuba	$451	$333,163	$147,480	$66,513.48	$677
Ecuador	$209	$162,080	$429,060	$89,673.54	$314
Guatemala	$67	$25,406	$598,740	$40,115.58	$101
Haiti	n/a		$322,548		
Mexico	$664	$4,776,258	$2,836,080	$1,883,157.12	$996
Panama	$358	$78,290	$89,664	$32,099.71	$537
Paraguay	$186	$46,013	$271,140	$50,432.04	$279
Uruguay	$414	$108,769	$56,736	$23,488.70	$621
5-Year Duration					
Argentina	$964	$2,462,514	$808,030	$778,941	$1,446
Costa Rica	$496	$87,668	$119,700	$59,371	$744
Honduras	$132	$28,554	$268,320	$35,418	$198
Nicaragua	n/a		$196,730		
Peru	$219	$406,015	$697,100	$152,665	$329
Trinidad & Tobago	$641	$63,921	-$360	-$231	$962
4-Year Duration					
Bolivia	$144	$35,357	$268,836	$38,712	$216
Chile	$374	$257,957	$335,200	$125,365	$561
Dominican Republic	$73	$21,980	$153,208	$11,184	$110
Venezuela	*$207*	$137,133	$552,140	$114,293	$311
3-Year Duration					
Brazil	$615	$1,780,292	$1,402,680	$862,648	$923
El Salvador	$81	$39,786	$107,628	$8,718	$122
WEIGHTED AVERAGE	**$498**				**$754**
SIMPLE AVERAGE	**$344**				**$469**
	Simple Average	**Totals**	**Totals**	**Totals**	**Simple Average**
W/O BRAZIL OR MEXICO	$311	$5,007,581	$6,717,536	$1,955,501	$467
ANDEAN	$198	$1,368,163	$3,348,166	$689,560	$297
CARIBBEAN	$386	$504,460	$391,664	$111,992	$579
MEXICO & CENTRAL AMERICA	$300	$5,035,963	$4,216,862	$2,058,880	$450
SOUTHERN CONE	$511	$4,655,545	$2,873,786	$1,840,875	$766
TOTAL		**$11,564,131**	**$11,153,026**	**$4,701,306**	

(*) **Expenditure per Pupil for 2010** is the public expenditure per pupil adjusted by 50% estimating an average annual growth of 3.0 from the 1995-2010 period.
Italics indicate 1991 figure.

Sources:
UNESCO, World Education Report, 1995; 1998. World Bank, World Development Indicators, 1998 CD-ROM. United Nations, The Sex and Age Distribution of the World Populations, 1996.

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Table 3
Teacher Needs

Countries	1995 Pupil-Teacher Ratio**	Existing Number of Teachers (1,000s) : 1995	Additonal Teacher Need by 2010 (1,000s)	Replacement Teacher Need by 2010 at 55% Replacement Rate (1,000s)	Total Additional Teacher Need by 2010 (1,000s)
7-Year Duration	394				
Jamaica	*22*	10.3	4.2	5.6	9.8
6-Year Duration					
Colombia	22	135.8	63.7	74.7	138.4
Cuba	10	73.9	14.7	40.6	55.4
Ecuador	13	59.7	33.0	32.8	65.8
Guatemala	*16*	23.7	37.4	13.0	50.5
Haiti	18	11.6	17.9	6.4	24.3
Mexico	17	423.1	166.8	232.7	399.5
Panama	18	12.1	5.0	6.7	11.7
Paraguay	12	20.6	22.6	11.3	33.9
Uruguay	18	14.6	3.2	8.0	11.2
5-Year Duration					
Argentina	*8*	319.3	101.0	175.6	276.6
Costa Rica	21	8.4	5.7	4.6	10.3
Honduras	*28*	7.7	9.6	4.2	13.8
Nicaragua	38	6.4	5.2	3.5	8.7
Peru	19	97.6	36.7	53.7	90.4
Trinidad & Tobago	20	5.0	-0.0	2.7	2.7
4-Year Duration					
Bolivia*	18	13.6	14.9	7.5	22.4
Chile	*17*	40.6	19.7	22.3	42.0
Dominican Republic*	22	13.3	7.0	7.3	14.3
Venezuela*	*8*	82.8	69.0	45.5	114.6
3-Year Duration					
Brazil	11	419.0	127.5	230.5	358.0
El Salvador	18	7.4	6.0	4.1	10.0
WEIGHTED AVERAGE	**15.6**				
SIMPLE AVERAGE	**17.9**				
	Simple Average	**Total**	**Total**	**Total**	**Total**
W/O BRAZIL OR MEXICO	18	964.4	476.4	530.4	1,006.8
ANDEAN	16	389.5	217.3	214.2	431.6
CARIBBEAN	18	114.0	43.8	62.7	106.5
MEXICO & CENTRAL AMERICA	22	488.9	235.7	268.9	504.6
SOUTHERN CONE	13	814.1	274.0	447.8	721.7
TOTAL		**1,806.5**	**770.7**	**993.6**	**1,764.3**

(*) Change in duration between time frames.
(**) Except in the case of Trinidad and Tobago, 18 is used as a default ratio when data for the country is not available.
Italics indicate 1992 figures.
Sources: UNESCO, World Education Report, 1995; 1998. World Bank, World Development Indicators, 1998 CD-ROM. United Nations, The Sex and Age Distribution of the World Populations, 1996.
Definitions: **Existing Number of Teachers** estimates the number of teachers by dividing total enrollment numbers by given student-teacher ratios.
Additional Teacher Need by 2010 estimates the number of additional teachers needed per country to maintain current pupil-teacher ratios.
Numbers were derived by dividing 1995-2010 enrollment increase by current pupil-teacher ratios. **Replacement Teacher Need - 55%.**
Replacement Rate estimates the number of replacement teachers required to meet current existing number of teacher figures.
Total Teacher Need by 2010 is the sum of the additional teacher need and replacement teacher need.

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